TRINITY HEALTH
INTERNATIONAL

34605 Twelve Mile Road
Farmington Hills, MI
48331-3221 USA

Ph 248.489.6100
Fax 248.489.6102

www.trinityhealthinternational.org

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Technical Assistance

For The

Santiago and Concepción Hospital

Renovation Projects in Chile

JAN 11 2006

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Final Report

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Presented by:

Trinity Health International

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Mailing and Delivery Address: 1000 Wilson Boulevard, Suite 1600, Arlington, VA 22209-3901
Phone: 703-875-4357 • **Fax:** 703-875-4009 • **Web site:** www.ustda.gov • **email:** info@ustda.gov

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A MEMBER OF TRINITY HEALTH

I. INTRODUCTION AND PROJECT BACKGROUND

Introduction and Background

Trinity Health International has been engaged by the Chilean Health Ministry through a grant by the United States Trade and Development Agency (USTDA) to provide technical assistance to the Ministry's project leadership teams working on two initiatives:

- The Salvador Infante Hospital Complex in Santiago
- The G.G. Benevente Hospital in Concepcion

The Salvador Infante Hospital Complex Project will ultimately result in the construction of a new tertiary hospital, integration of a range of clinical and support services between the Salvador Infante Hospital, the National Institute of the Thorax, the National Institute of Neurosurgery, and the National Institute of Geriatrics, and development of appropriate infrastructure support, including IT, nursing models and management systems. The complex will also be the first effort by the Chilean government to develop a Private Public Partnership model (PPP) in healthcare. In the model, the design, construction, and ultimate operation of the building and key support services will be funded and operated by the partnership, thereby creatively raising necessary capital, transferring certain risks to the private sector, reducing operating costs, all hopefully without compromising major policy initiatives. The Chilean Health Ministry in fact, pursues an aggressive reform agenda, focusing on access and quality of care.

The G.G. Benevente Hospital project in Concepcion includes the development of an ambulatory care building on the campus, consolidating And replacing outpatient services currently located in the oldest building on the campus, and the replacement of the orthopedic/trauma hospital currently located adjacent to the campus. The trauma/orthopedic hospital, which is currently free standing, and across the street from the main hospital will be integrated with the main facility and outpatient facility. This project is much further developed than the project in Santiago. In fact, it is scheduled for bidding in fall of 2005. It is being financed traditionally, and is not part of the PPP initiative contemplated in Santiago.

The technical assistance project is intended to provide the Ministry of Health planners with insight into U.S. models of hospital planning, clinical management and administration, and for the U.S. team to review elements of the work done to date on the two projects and provide recommendations where appropriate. In many respects, the Health Ministry views the Salvador Infante Hospital Complex Project as an opportunity to develop systems and models of care that can be reproduced nationally...during its long history, and even today, it is seen as an innovator in the Ministry. The technical assistance tasks, as identified in the Definitional Mission are summarized as follows:

1. Review background information and financing plans
2. Develop recommendations for clinical management systems
3. Review environmental impact and identify mitigating actions and associated costs
4. Develop plans and designs for hospital and outpatient clinic administrative and management systems
5. Evaluate current architectural plans and make recommendations on needed revisions
6. Develop plans and provide recommendations on appropriate equipment and technologies
7. Prepare and present final report

The Trinity Health International Project Team includes:

• Robert Beyer, FACHE	Project Director
• Dr. Douglas Edema, MD	Clinical/Medical Care Delivery Specialist
• Don Velsey, AIA	Architect
• Joyce Durham, RN, AIA	Architect, Nurse
• Robert Larkin	Medical Equipment Planning Specialist
• Russ Jones	Medical Equipment Planning Specialist
• Frank Smith	Hospital Information Systems Specialist
• Pierre Gonyon	Waste Management Specialist

The team made two site visits to Chile to observe and evaluate on site facilities, equipment, systems and processes across the projects, and to interview and to actively engage with members of the Chilean team in the planning process. (See Appendix for agendas/schedules.) A third visit to review final recommendations will occur concurrent with the delivery of this report.

II. FINDINGS AND RECOMMENDATIONS

A. Clinical and Administrative Management Component:

ONSITE MEETINGS AND OBSERVATIONS:

1. Physicians currently see themselves on three (3) very distinct medical staffs (four if you consider the Geriatrics Institute).
2. Several of the informal physician leadership feel they have not been heard to date, specifically related to their concerns about the project being financially and administratively driven as opposed to being clinically driven.
3. The lack of cohesion and the feeling of being disenfranchised will greatly inhibit a public/private partnership solution, particularly in the area of Information Technology.
4. Currently, there is little coordinated activity between the four hospitals related to staffing, general human resource issues, education, and support services in general.
5. There is a consistent message of transitioning from "sick care" to prevention. This was heard at the Ministry of Health, Salvador Infante Hospital and in Concepcion. The health policy is very sophisticated, well thought out, and can be articulated at many levels.
6. The primary care focus is currently not incentivized by the compensation model in place.
7. Examination of the nursing model revealed large variability in staffing ratios, lack of consistent leadership skills, few care protocols and unclear lines of reporting relationships.
8. A very detailed and well-developed Nursing Management Model has been documented and its implementation needs to be coordinated with the development of any medical and/or administrative management models.
9. There appears to be significant variation in cost metrics (cost/cubic meter was one example used).
10. There appears to be significant variation in basic procedures (e.g. Sterilization processes).
11. There appears to be a history of negative experiences with outsourcing in the past (e.g. timing of receiving supplies).
12. The vision for ancillary and clinical support integration does not seem to be universally shared.
13. The team heard both the Thorax Institute and GG Benavente state the goal of being the national referral center for thoracic surgery. Are these in conflict?
14. The magnitude of change needed in the care processes is significantly understated.
15. There is a history of frequent turnover in leadership (clinical, administrative, and governmental).

RECOMMENDED STRATEGIC INITIATIVES:

Strategic Initiative # 1:

Proactively manage the significant change process, which will occur in the transition from the current organizational model/facility configuration to the concept of the Salvador Infante Hospital *Complex*. Managing the change process will be as critical a strategic imperative as any that the project team has encountered to date. For example, Physician and nursing leadership and active involvement in the process will be critical to its success. Moreover, the development of a PPP model in healthcare will not only be a technical challenge, but a political challenge...some providers and the public see the PPP as privatization, a shift away from a government sponsored healthcare system to a private system driven by economics. The Chilean Project Team has begun to address an approach to intentional change management, under the leadership of Dr. Ignacio Astorga. Additional support resources have been added (Sra. Claudia Figueroa Ruiz), and the Trinity Health International Team was asked to conduct an introductory seminar to the Complex leadership team on Change Management. The presentation slides form that seminar are included in the Appendix.

Action Steps:

1. Educate management in change management skills.
2. Consider minimizing traditional leadership transitions at the complex during the change initiative.
3. Engage staff in rigorous dialogue around plans and substantive changes.
4. Identify the "wins" for each of the institutional components.
5. Institutionalize the change management process.
6. Utilize the Nursing Management Model as the focus for discussions related to transformational change.

Strategic Initiative #2:

Facilitate a broader, more consistent, active role for nursing leadership within the Complex Clinical Management Model. The Nursing Management Model currently outlined represents best practice as we see it, and a relevant model to consider. It should receive full an active support from the Directors.

Action Steps:

1. Consider an inpatient unit management model that is driven by nursing care, *in support of the clinical department needs.* In the language of the "Organization Model" for the complex, move the inpatient care from a "decentralized" model to "integrated-not concentrated".
2. Facilitate a process to gain active consensus of the Model by the Director Team.
3. Build appropriate incentives into the Director's performance expectations for substantive implementation of the recommendations.

4. Consider a Ministry wide Nursing Leadership initiative to take advantage of the potential across the system. Our opinion is that in the traditional hierarchical leadership model in Chile, the potential of the nurse as a clinical leader is not fully realized.

Strategic Initiative # 3:

Increase the physician input, and subsequent buy in, to various proposals being developed by the project leadership team, related to not only the shared services aspects of the Salvador Infante Hospital Complex, but to the overall strategic development as well.

Action Steps:

1. Identify formal and informal physician leadership.
2. Form a physician council with a charge of obtaining, reviewing and interpreting physician input, insuring representation from each component of the complex.
3. Survey medical staff regarding various initiatives being proposed.
4. Have the physician council review information and make recommendations. This could potentially result in a "slowing" of the process for a period of time to allow for the "catch up" of the physicians, but in the end, a more universally accepted process.

Strategic Initiative # 4:

Maximize efficient use of ICUs (both those to be maintained and new to be built) through clearly defined care protocols. An example of transfer protocol is included in the Appendix.

Action Steps:

1. Clarify proposed care model for the Salvador Infante Hospital Complex ICU.
2. Define level of care for each ICU with specific transfer criteria.

Strategic Initiative # 5:

Facilitate implementation of the Minister of Health's vision for a primary care driven health care delivery system, specifically by enhancing the primary care – hospital integration.

Action Steps:

1. Restructure the compensation and reimbursement model for primary care centers and physicians to incent behaviors that will improve the access to care and the quality of care. For example, provide a financial incentive to primary care centers to minimize the use of the emergency room by the patients cared for in that center.
2. The IT solution needs to facilitate sharing of clinical information between the primary and secondary care givers, building on the current scheduling systems which appear to work well.
3. Develop incentives for healthy lifestyles for patients.

Develop primary care (or "Fast Track") capability on the Salvador Infante Hospital Complex campus.

Strategic Initiative #6:

Clarify visions of Institute of Thorax and GG Benavente Hospital in Concepcion relative to their goal of being the national referral centers for thoracic surgery.

Action Steps:

1. Engage the directors of the Concepcion and Eastern regions and their leadership teams in two-way dialogue to clarify strategic priorities and intent.
2. Ensure demand calculations for each region did not use same populations statistics, thereby overestimating need.

Strategic Initiative #7:

Incorporate in the new medical management model of Salvador Infante Hospital Complex the ability to better meet the requirements of the AUGE legislation.

Action Steps:

1. Analyze more closely the model of integration delineated in the Nursing Management Model document regarding the relationship between the Instituto Nacional de Geriatria and the primary care centers.
2. Clarify the financial incentives currently in place (if any) that would motivate providers to meet the requirements.
3. Develop "dashboard" clinical outcomes reporting model. An example is included in the Appendix.
4. Determine if the nursing model of integration with the primary care centers might be extrapolated to case management of the AUGE diagnoses.

Strategic Initiative #8:

Consider the development of a Health Ministry based team to provide coordination, oversight and specific liaison to the PPP dimension of the project (and future development of the PPP model in the Health Sector). Our recommendation would be that the team be co-directed by a senior physician, as Medical Director (not necessarily a full time role), and a Project Director (full time), who has extensive experience in complex construction project management. The Project Director should also have experience in multi-disciplinary team management. The balance of the team need not be full time, however, they need to have dedicated time available to serve explicitly the PPP. Disciplines/decision-makers represented on the team might include:

- Clinician Planning Consultant Preferably a nurse who has had planning experience, and can represent the clinician user groups to assure the clinical functional programs are being accommodated properly.

- Logistical/Support Service Planning Consultant. Possibly an Industrial Engineering background...someone who can assure that the support service/sanitary functional programs are being accommodated properly.
- Equipment Planner.
- Cost Analyst
- Public Relations/Communications Consultant
- Architect
- Mechanical Engineer
- Electrical Engineer

The idea here is to have a team that is quality oriented and directly accountable to the *Health Ministry,* and is absolutely focused on the PPP relationship, allowing the on site clinical and administrative teams to focus on the substantial challenges of project implementation "on the ground" *and* their full time roles of taking care of patients.

CONCLUSIONS:

Understanding more completely the relationship between the Salvador Infante Hospital Complex and the primary care centers will aid in formulating specific recommendations related to better integrating care and better utilization of resources in order to meet the requirements specified in the AUGE legislation. It is obvious from the Nursing Management Model document that much thought has already gone into the concepts of integration of care and how best to provide care to the patient in a high quality and timely fashion.

It will be critically important to further clarify the "wins" for each of the components of the complex, particularly the Institute de Torax, where there is significant resistance to any additional integration between the Institute and the Salvador Infante Hospital In addition, identifying, labeling and addressing the concerns of each will need to be done on an ongoing basis.

Programmatically, integration can and *should* begin before the actual renovation is completed. In many cases, in advance of the final facility development, full program integration need not be emphasized. Instead, the development of better care processes should be ongoing, and will be further facilitated by the renovation. By their very nature, these improvement processes will be collaborative and integrative. Also, there are aspects of the complex, such as rehabilitation services and purchasing that are appropriate for active integration at the present time and in fact, the integration should be undertaken even in the absence of the project..

The most significant observation is the incredible change process that must be accomplished. It cannot be overstated the amount of focus and work this will necessitate. As we have stated in our dialogue with the Project Team, the project to date has been very well *engineered*...it needs to be *"peopled"* in order to ensure its ultimate success. Moreover, the Health Ministry must maintain ultimate control of quality in the PPP Model.

B. Environmental Impact, Occupational Safety and Health and Logistics Component

INTRODUCTION

The USTDA awarded a grant to Trinity International to form a team to advise the Chilean Ministry of Health on the construction of new healthcare facilities. The grant proposal included an environmental impact component. Which is reflected in this document.

During research for preparation for the visits to Salvador Infante and Concepcion it was noted that Chile is a signatory to virtually every major international accord regarding environmental protection. The interest in minimizing the environmental impact of their new facilities clearly signals the importance that the Chilean government and the Ministry of Health place upon these commitments.

During our visits we toured many Ministry of Health facilities and it we were greatly impressed with the skill and dedication displayed by staff while delivering the best patient care possible even in the face of limited resources and aged facilities. It was clear the Ministry is committed to developing state of the art facilities served by up to date information systems, modern medical equipment, effective leadership and patient care models while protecting the natural environment and community health. Trinity International is pleased to be a part of this effort.

SCOPE OF PROJECT

The environmental goal set forth in the grant documents stated in Task Number 3 was to, "Review environmental impact and required mitigating actions for safe processing and disposal of hospital and clinic toxic and infectious wastes, develop a comprehensive environmental protection and waste disposal plan and calculate their associated cost." Because this project presents an ideal opportunity to address a number of issues facing the Ministry of Health as well as an opportunity to explore several areas of cost savings, additional observations and recommendations are offered concerning:

- Construction site safety
- Owner Controlled Insurance Program (OCIP) for construction projects
- Construction site air quality and infection control Issues
- Green building guidelines
- Occupational safety and health
- Separation of patient care and logistical pathways
- Logistical system issues and recommendations

FACILITY CONSTRUCTION PLANNING

It is extremely important that environmental and safety impacts are considered during the planning process. At both the Salvador Infante complex and the Concepcion site, major construction will be occurring while healthcare operations continue onsite, presenting issues surrounding phasing of various stages of the project. Large-scale construction projects present an array of safety issues and the potential for serious environmental impacts during demolition and actual construction. It is a critical component of construction planning that these issues are fully evaluated and protective measures are integrated into the overall project.

In the Salvador Infante project, the Terms of Reference (TOR) should specify the protections and procedures to be put in place so that they become an integral part of the overall execution of the project and therefore will be accounted for in the contract with the general contractors and the various subcontractors. The same or similar requirements should be placed in the bid documents for the Concepcion project as well.

CONSTRUCTION SITE ENVIRONMENTAL AND OCCUPATIONAL SAFETY AND HEALTH CONSIDERATIONS

Construction Site Safety

Large-scale construction project sites are inherently hazardous and controlling hazards to the extent possible will reduce the instances of injury, work disruption and property damages. In North America, governmental occupational safety and health regulatory agencies monitor worksite safety conditions in recognition of the safety issues found on construction sites. Worker injuries and property losses can substantially increase the unbudgeted cost of projects and a good plan to control hazards will reduce losses and insurance claims.

The Salvador Infante project TOR and the Concepcion construction bid documents should address these issues by requiring adequate loss insurance for the projects, a construction site safety program including a safety training program and requirement of a construction site Safety Officer. The function of the Safety Officer would be to continually inspect the site for hazards and loss risks, correct issues and eliminate hazards before injury or losses can occur. The workplace should be kept neat and orderly, and accepted occupational safety precautions should be practiced at all times. In addition, environmental safety and health issues can be monitored for compliance. All experienced international general contractors will have experience with these requirements.

The Ministry of Health may want to consider the advantages of an Owner Controlled Insurance Program as opposed to requiring the general contractor to carry the insurance coverage. Under this program the owner controls the insurance program and hires the Construction Safety Officer to monitor occupational and environmental safety and health on the work site. This option can return substantial savings through insurance rebates to the owner by retaining control and reducing loss risk and by directly monitoring compliance of the contractors with the construction safety program.

Recommendation: Place a requirement in the Salvador Infante TOR and Concepcion bid documents for adequate loss insurance protection, a construction site safety program, safety training program and construction site Safety Officer.

Recommendation: Consider implementing an Owner Controlled Insurance Program, which includes retaining owner responsibility for the construction site safety program and requires the hiring of a construction site Safety Office that will report to the owner**Air Quality and Infection Control**

During our visit to Salvador Infante, it was clear that the Santiago metropolitan area has a severe air pollution problem with smog clearly visible in the atmosphere. Air pollution is often associated with respiratory illnesses and other health problems and the planning for the construction of healthcare facilities should make every provision to minimize adding to the problem. In addition, at both Salvador Infante and the Concepcion projects, healthcare operations are to continue onsite during the projects. Large-scale construction projects require the use of heavy equipment, which emit exhaust pollution including particulate products of combustion, sulphur dioxide and other hazardous pollutants as well as unburned hydrocarbons. In addition heavy equipment can raise vast volumes of dust.

At both locations there is only limited use of central air handling and air filtration systems and there is a very large potential to impact patient care and indoor air quality in patient care areas during demolition and construction with the potential to create both infection control and respiratory hazards to patients, visitors and staff. A best practice that has been developing in the United States is the use of bio-diesel fuel and exhaust filtration devices or scrubbers for heavy equipment used on healthcare construction sites. At St. Joseph Mercy Hospital in Ann Arbor Michigan diesel fumes from heavy construction equipment often disrupted patient care and sometimes halted construction activities. The implementation of the use of bio-diesel fuel and exhaust filtration has completely eliminated this problem. Construction site dust control is imperative for both projects and can be accomplished in a variety of ways. Any large contractor will have experience in this area.

In North America, the Centers for Disease Control (CDC) have established guidelines to assure a safe patient care environment through an Infection Control Risk Assessment (ICRA) program that is to be implemented during construction projects that can impact patient care areas. The ICRA policy is implemented by the Infection Control department and works closely with the contractors and Construction Safety Officer to monitor compliance. In light of the fact that both projects will be occurring in proximity to occupied patient care areas and the use of modern central mechanical air handling systems in extremely limited, it is extremely important to implement an ICRA policy and procedure to assure a safe environment for patient care activities. The CDC guidelines can be found at http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5210a1.htm .

Recommendation: Specify the use of bio-diesel fuel and exhaust filtration in the Salvador Infante TOR and the construction bid documents for the Concepcion project.

Recommendation: Require dust control measures in the bid documents for both construction projects. Specify that any application of substances to control dust must be either water or be safe to human health, aquatic life and be biodegradable.

Recommendation: Implement an Infection Control Risk Assessment policy and procedure to be diligently applied during all phases of the project to assure a safe patient care environment.

Storm Water Control Plan

In any large-scale construction project, large surface areas will be disturbed, presenting the potential for erosion control and storm water control issues. In addition construction sites often require the storage of solvents, paints, fuel and other hazardous materials that represent a hazardous material spill hazard. During the second visit we discovered that because of the inadequacy of the storm waster system in Santiago, the Salvador Infante complex will be required to manage storm water onsite both during construction and after the facility is constructed. In Concepcion it was unclear what connections if any to a community storm water system are present. .

In most communities, the storm drain system generally discharges directly to surface water and the release of silt or surface pollutants through erosion or the accidental release of hazardous materials to the storm drain system represent a pollution hazard, a danger to aquatic life and surface water users downstream of the release. It is imperative that construction site storm water control plans are addressed in the TOR and construction bid documents for both projects during the construction.

For that Salvador Infante site, the TOR must require that the facility design address the requirement that the facility manage storm water on site. Many facility designers have developed several innovative ways to manage storm water such as storm gardens and decorative retention ponds and fountains. The design team should research best practices for onsite storm water management and select the options best suited for the site.

Recommendation: Require a storm water control plan in the TOR and/or bid documents for both construction projects. Plan components should include:

- Use of erosion control devices;
- Storm water catch basin maintenance plan and schedule if appropriate;
- Requirement to minimize the onsite storage of hazardous materials;
- Requirement for secondary containment measures for any hazardous material in containers of 5 gallons or more;

- Requirement for a spill response plan that includes provisions for:
  - The identification of potential spill hazards;
  - Notification procedures;
  - Onsite availability of spill response equipment and materials;
  - Emergency spill response contractor agreement or proof of spill response expertise.

Recommendation: The TOR must contain a requirement to consider the onsite management of storm water in the new facility design. The design team should investigate best practices to include in the TOR.

Demolition Plan

Demolition of existing structures will be a part of both projects. At the Salvador-Infante complex, extensive demolition of very old buildings will occur with considerably less extensive demolition required at the Concepcion site. Demolition of old buildings present their own set of environmental and occupational safety and health issues and it is important to address them in the TOR and the construction bid documents through a requirement for a demolition plan.

The buildings themselves are largely built of concrete. During the demolition the potential to create a concrete dust hazard is very large. Concrete dust is extremely irritating to the eyes and respiratory tract and represents a serious hazard to patients suffering from respiratory ailments. Concrete dust exposure is recognized as a serious occupational health hazard in North America, and employers must take steps to prevent exposure. Concrete dust is also extremely abrasive and will damage equipment if it is allowed to penetrate into patient care and staff work areas during the demolition phase of the projects.

For the same reasons that construction site dust generally can be disruptive to continuing patient care activities at both sites, hazardous concrete dust will significantly, perhaps greatly, contribute to the problem. This will be a serious problem for the Salvador Infante project if the complicated phased demolition and construction option is selected that requires extensive demolition immediately adjacent to occupied patient care areas including surgery and inpatient units. Concrete dust can be controlled effectively with water. Care should be taken to regulate the use of water to control dust so that runoff to the storm drain system is avoided.

It has become the standard of care for the demolition of healthcare facilities to identify environmental and health hazards before demolition begins and remove those hazards before or during demolition. A demolition plan will thoroughly address these issues, contribute to a safer project, and eliminate the possibility of environmental releases. At both hospitals it is likely that elemental mercury will be found in plumbing traps in some locations. Mercury is also commonly found in mechanical system control components, switches, valves and thermostats. All sources of mercury must be identified and removed for proper disposal prior to demolition. Clinical Lab areas use large amounts of hazardous materials and they should all be identified and removed before demolition begins.

At the Salvador Infante site, it was noted that xylene, alcohol and other flammable wastes were being disposed of through the sanitary sewer system. It is highly recommended that this practice be discontinued immediately. In any event, care must be taken that no pockets of flammable materials are in the plumbing to present a fire or explosion hazard during demolition in those areas of the building where flammable liquids were used. When the buildings are abandoned for demolition, all paints, solvents, mercury devices and other environmental and health hazards must be removed for proper disposal. Electrical distribution systems must be examined for transformers or other components that contain cooling oil contaminated with PCBs. Given the age of these structures, PCBs are likely to be found. It is important that this bio accumulative toxin is identified and properly managed for disposal. Included in the Appendix is an environmental demolition checklist that is being used extensively as part of large construction projects in the United States and elsewhere and can easily be incorporated into the TOR and the construction bid documents for the projects.

The demolition plan should require the recovery of various materials for recycling and/or sale to avoid landfill costs and produce revenues to help offset costs. This will require the development and implementation of a plan to identify and properly separate recoverable materials during demolition and later during actual construction. The concrete rubble that will be produced can be used as clean fill or can be crushed for roadbed materials or other uses. Recovery of the massive amounts of concrete for other uses will avoid expenses for landfill costs and may even produce an offsetting revenue stream if a market can be found for the materials. A possibility is sale of the materials to the national road construction concession as clean fill for berm construction or materials to be crushed for roadbeds.

During our facility tours it was clear that only limited amount of structural steel have been used in the construction of the old facilities but at the Salvador Infante Complex, beautiful aged wooden structural beams were evident. These wooden beams are very valuable and care should be taken to recover them undamaged for sale to offset costs. It was observed that large amounts of plastic and metal conduit materials and various cables and wiring were often surface-mounted and easily recoverable. These materials are marketable and diversion from landfill will reduce project costs while recovery and sale can produce a revenue stream to offset construction costs. Cast iron plumbing is also a recoverable material and should be separated for sale. We were told during our tour that plumbing or lighting fixture and other items were rarely discarded but were recovered for reuse. Plumbing fixtures, light fixtures and other items should be recovered for sale to reuse vendors to offset costs and avoid landfill fees. Florescent tube fixtures and light ballasts should be recovered for sale to reuse vendors or separated for metals recycling. *Care should be taken to collect florescent light tubes for proper disposal to avoid mercury contamination in landfills.*

Recommendation: Require a concrete dust hazard control plan in the TOR and construction documents.

Recommendation: Require a demolition plan that includes an environmental checklist to identify and remove environmental and occupational safety and health hazards. (An example of an environmental checklist is included in the Appendix).

Recommendation: Require a material recovery plan that includes provision for the Include the requirement that revenue offset construction costs. Recoverable materials include:

- Concrete rubble
- Metals, wire, cabling, conduit and plumbing
- Wooden structural beams
- Plumbing, lighting and other fixtures
- Other appropriate materials

Disposition of Discarded Equipment

During our visit it was clear that the intent was to fully upgrade the patient care equipment used in these new facilities. Discarded equipment also sometimes contains hazardous components. For example video screens can have as much as 8 pounds of lead and medical equipment will often contain batteries or hazardous heavy metals. In North America, it is now illegal to utilize landfills to dispose of many types of electronic equipment including many computer components and several types of batteries. They must be collected for proper disposal or recycling. A plan should be developed manage these types of waste. A possibility is to make a requirement in the contractual language for the concessionaire consortium Information Systems and Medical Equipment suppliers to accept the discarded computer and medical equipment for de-manufacturing, recycling or proper disposal as appropriate.

A plan should be developed to manage discarded beds, stretchers, gurneys, carts and any other metal equipment. The first option should be to salvage reusable equipment in good condition and refurbish for future use or relocate to other Ministry of Health facilities. The recent worldwide increase in the price of steel and other metals make scrap metal an increasingly valuable commodity and metals should be collected for sale to help offset costs for new equipment.

It is likely that there will be older equipment to be discarded that contains refrigerants. Environmental release of refrigerants is associated with atmospheric ozone depletion, and the proper management of ozone depleting products is the subject of worldwide accords of which Chile is a signatory. A refrigerant control plan should be developed to identify and manage refrigerants in any discarded refrigeration and air conditioning equipment.
It is likely that old radiology and other diagnostic equipment will contain coolant oils contaminated with PCBs. It is important that such equipment is identified and properly managed to assure that PCB contaminated oils are recovered for proper disposal.

Recommendation: Place a requirement in the concessionaire agreement for the medical equipment and information systems suppliers to accept discarded equipment for de-manufacturing, recycling or disposal as appropriate.

Recommendation: Develop a plan to identify and collect discarded equipment to recover and sell metals to offset new equipment costs.

Recommendation: Develop a plan to identify and manage refrigerants for proper disposal in any discarded refrigeration and air conditioning equipment.

Recommendation: Identify all equipment containing PCB contaminated oils and coolants and manage for proper recovery and disposal.

NEW FACILITY DESIGN CONSIDERATIONS

Facility Design Impact on Occupational Safety and Health

New facility design is an ideal opportunity to identify and correct occupational safety and health hazards. During our visit our team observed many hazards that can be corrected during the design process of both work processes and the new facilities. The application of the industrial hygiene hierarchy of hazard control will greatly assist in the identification and control of a wide variety of hazards.

Hierarchy of Hazard Control

- Eliminate the Hazard
- Engineering Controls
- Process Change
- Personal Protective Equipment

Ideally each department should work to develop safe and efficient operational models for the processes that will be performed in their areas of responsibility. Departmental leaders and staff should investigate best practices and processes worldwide for their discipline and then work with the facility designers to incorporate the improvements in process and develop equipment specifications to eliminate or control hazards to the extent possible. These departmental teams should carefully identify each step in every departmental process and identify all hazards such as the storage and use of flammable, explosive, toxic or dangerous chemicals; mechanical hazards; potential for radiation exposures; and environmental safety and health risks and hazards.

Once all hazards and risks are identified the team should apply the hierarchy of hazard control to eliminate or reduce the hazard to the extent possible. The teams should research best practices for their discipline to identify ways to eliminate the hazard such as non-hazardous substitutes for flammable or dangerous chemicals. Where it is impossible to eliminate the hazard then assure that proper engineering controls are in place such as vapor hoods to control exposure to hazardous chemicals; guards and shields for mechanical hazards; and barriers or rails for fall hazards. Process changes should be considered to reduce hazards such as changing a procedure to eliminate the need to lift heavy objects over shoulder height or prohibiting lifting loads over a certain weight to reduce the risk of musculoskeletal injuries. Lastly, personal protection equipment should be considered where other hazard control strategies are not possible or for additional protection. A good example is requiring the use of gloves to provide protection from blood borne pathogens.

Recommendation: Convene departmental teams to begin the development of work processes to occur in the new buildings. Focus should be on researching best practices for each discipline, identification of hazards and the application of the hierarchy of hazard control to eliminate or minimize hazards to the extent possible. The results of the process design should be shared with the facility design team to assure that building design and equipment specifications support the redesigned work processes and reduce or eliminate hazards of all kinds. Consider the use of facilitators skilled in work process design to assist the process.

Fire Safety Considerations

It is assumed that these new facilities will incorporate the use of modern fire suppression systems, fire alarm systems, and emergency exit signage and smoke and fire separation-building techniques. Among the greatest fire hazards in healthcare facilities is the failure to provide adequate storage for patient care equipment, displaced beds, supplies and other items. Inadequate storage in patient care areas, especially inpatient units, invariably results in improper storage and clutter in corridors, blocked egress to fire exits and blocked fire alarm pull stations and fire extinguishers. This is a serious issue in North American hospitals and we observed many instances of blocked and cluttered corridors during our visit to the project hospitals. The major danger of fires in healthcare facilities is rarely heat and flames, but smoke and toxic fumes that hinder sight and can quickly overcome patients and staff. Blocked egress in areas where non-ambulatory patients are cared for can cause loss of life for patients and staff. For these reasons it is important to collect information on all the equipment and supplies that are likely to be used on patient units and diagnostic and treatment areas and ensure that adequate storage is provided in the new facility design.

Redesigned logistical processes will have an impact on the provision of storage spaces throughout the new facility. It is important that departmental teams that are working on logistical processes identify the storage needs for pharmaceuticals; supplies of all kinds as well as medical and patient care equipment. The results of this effort will help identify endpoint storage requirements as well as intermediate staging and handling areas. The results of this work will be of great help to the facility design team so that storage considerations and efficient logistical pathways are incorporated into the design of the new facility.

Recommendation: Determine accurate storage needs in all patient care areas through departmental teams working to redesign work processes and logistics. Share results with the facility design team to assure that storage and logistics are fully considered during the facility design.

Facility Design Impact on Environmental Safety and Health

The design of new healthcare structures presents the opportunity to incorporate newest design concepts to minimize environmental impact. Historically healthcare facilities focused on the delivery of healthcare to the population and community they served, with little regard to the negative impact to the environment, which ultimately can negatively affect public health.

In the past, often the most advanced healthcare technologies incorporated the use of mercury and hazardous materials and hospitals created large amounts of infectious, hazardous chemical and solid waste. Waste management was often based on incineration with little or no environmental pollution controls resulting in environmental releases of pollutants and bio accumulative toxins. Imaging technologies relied upon chemical film processing requiring the use of large amounts of hazardous chemicals and film resulting in the discharge of chemicals and heavy metals to the sanitary system. Facilities were designed and built to deliver healthcare services based on the technology in use at the time with little thought given to environmental issues. This evolution resulted in increasingly effective healthcare while creating a workplace filled with occupational hazards, buildings with a large environmental footprint while creating and releasing pollutants that ironically had the potential to harm the health of the communities they were pledged to serve.

During the planning for the Salvador Infante and Concepcion projects, the Ministry of Health has an opportunity to evaluate the impact their new facilities will have on the environment, as well as community health, and select the safest possible materials, processes, and equipment that have the least negative impact to the natural environment which all of us depend upon for life and health. Planning for environmental safety and health during the design process for new healthcare facilities is clearly in complete harmony with the mission of healthcare providers to promote and improve the health of the communities they serve and to "First, do no harm".

Green Building Concepts

Leadership In Energy and Environmental Design (LEED) guidelines are increasingly being adopted in the design and construction of buildings in many industries. Several healthcare facilities have been built recently using these guidelines and some hospital facilities have been LEED certified. In many ways green building guidelines are ideally suited to healthcare facility design because application of these concepts result in buildings that reduce environmental impact and help promote and protect the health of the communities they serve. The LEED guidelines can be found and purchased at the U.S. Green Building Council website http://www.usgbc.org.

Many hospitals are also using the Green Guide for Health Care (GGHC). These guidelines incorporate some of the LEED information but include other healthcare specific considerations as well. The document is very comprehensive in nature and these guidelines should also be considered during the design stage of both the projects. An electronic version of this document is included on a CD with the report..

In the case of the Salvador Infante and Concepcion projects, the design teams should consider the guidelines and choose those options that will help reduce negative environmental impacts, especially in the areas of reduction in the use of vinyl and PVC materials, the elimination of mercury devices and hazardous substances in the mechanical systems and building materials and the use of recycled content building materials and designing for efficient waste management and recycling processes. Application of many of the guidelines will result in substantial long term cost savings, especially in the areas of energy and water conservation. Due to financial restraints, some of the guidelines may not be useful to the Salvador Infante and Concepcion projects.

Recommendation: The Design teams should consider the LEED and Green Guide for Health Care guidelines and consider those items or recommendations that will reduce negative environmental impact, will reduce costs and are appropriate for the projects. The selected requirements should be placed in the Salvador Infante TOR and the design specifications and bid documents for the Concepcion project.

Energy and Water Conservation

Energy and water conservation is an integral component of green building design and because of the huge potential for long term cost savings, it is worth exploring in greater detail here.

It is important to thoroughly investigate and specify energy efficient HVAC and mechanical equipment in the TOR and bid documents even if it may result in an increase to the initial cost of the projects. Many hospitals in North America are retro fitting energy and water efficient equipment and specifying control systems that greatly reduce energy and water use and save substantial energy costs, while designers for new construction projects ensure that these systems are selected during the planning stage. Many companies, such as Johnson Controls, Honeywell and Siemens, make excellent control systems for HVAC systems with central computer monitoring and control that greatly reduce energy use and result in substantial energy cost savings over the life of the structure.

Mechanical systems include the use of many large electrical motors and components. Specifying "soft start" motors and components will eliminate peak and surge energy demand that greatly increase electrical costs.

The design teams should ensure that energy efficient lighting is specified for both projects. The slight increase in initial costs will return significant energy savings long term. Many modern facility designs specify the use of motion sensor lighting and other automatic means to eliminate the use of energy when it is not needed.

Careful consideration should be given to the selection of ancillary and support equipment of all kinds throughout the new facility to ensure that they are energy efficient. In the United States the Environmental Protection Agency uses the Energy Star rating system to rate the energy efficiency of a wide variety of electrical equipment from refrigerators to computer monitors. The Salvador Infante TOR should include the requirement to select and specify energy efficient equipment using the Energy Star or equivalent rating system.

Water conservation should be considered during the selection of mechanical systems, plumbing fixtures and departmental work process design. It should be specified in the TOR and construction bid documents that water conservation and water use efficiency should be considered during the selection process for all equipment that uses water. Simply selecting low water use toilets can save tremendous amounts of water over the life of the facility. Mechanical equipment that utilizes low water use technology, re-circulating systems and make up processes likewise will conserve water and save operating costs. It is also important for departmental teams that are designing new work processes or selecting new equipment consider water use as part of the design or equipment selection process.

Recommendation: Specify energy efficient HVAC and mechanical systems in the Salvador Infante TOR and the Concepcion construction bid documents.

Recommendation: Specify automated centralized energy control and monitoring system including centralized computer display and control.

Recommendation: Specify "soft start" electrical motors and components.

Recommendation: Specify energy efficient lighting for both projects. Consider the use of motion sensors and other automated devices for energy conservation where appropriate.

Recommendation: Specify energy efficient ancillary and support equipment. Consider "Energy Star" or equivalent energy rating system during the equipment selection process to evaluate long-term energy conservation potential and costs during the purchasing decision.

Recommendation: Require the selection of water efficient equipment, mechanical systems and plumbing fixtures in the TOR and construction bid documents.

Recommendation: During departmental work process redesign activities, consider water use issues and include water conservation in the selection criteria of new departmental equipment.

Waste Management

During the Trinity International team visits, time was spent examining waste management processes at many of the facilities that we toured. Selected waste streams were traced from the point of generation all the way through to final disposal in many cases.

It was clear that the facilities we toured generated much less waste than equivalent sized North American hospitals. This stems from a variety of reasons such as very limited use of disposable supplies and materials, which has unfortunately become prevalent in the healthcare industry in the United States and elsewhere. The low use of disposable supplies should be maintained to the extent possible in the new facilities. It was also noted that there is simply a smaller amount of items in the various supply streams, which ultimately results in less waste. This consultant was impressed by how few items were on the shelves in the storerooms and warehouses in comparison with a North American hospital. This may be the result of fewer resources available for the purchase of supplies of every kind.

Medical Waste

At all the facilities we visited we discovered that sharps were being handled in a very different manner than is seen in the United States. In most cases needles, lancets, syringes and other sharps were collected into "safety boxes" which were lined folded cardboard containers marked with medical waste and bio hazard symbols and clearly manufactured for the purpose of managing sharps. It was noted at both the Salvador Infante complex and Concepcion that some staff had made their own safety boxes out of small cardboard boxes and were using them to collect sharps. The exception to the use of the cardboard safety box was found in the Torax Institute, which was using a tin container, which evidently was less expensive than the safety boxes, onto which the facility staff welded a cap when it was full. In North America the general requirement for sharps containers is that they be "puncture proof" and be clearly marked with the biohazard symbol. Once filled to a predetermined level they must be capped with a lid that locks down and makes the container very difficult to open.

At the Salvador Infante site, sharps were collected from the various facilities and placed in the waste containers provided by the municipal waste authority at each facility. The municipal waste handlers were actually employees of a subcontractor contracted with the municipal waste authority. The sharps were dumped into compactor trucks along with the regular solid waste. It should be noted that in most cases only the needle was placed in the sharps containers with the syringe removed and disposed of separately in the regular waste so the over all volume of sharps waste in safety boxes is much less than would be generated in a U.S. hospital. In Concepcion the collection process for medical waste was similar except the safety boxes and other medical waste was transported separately to a simple single stage incinerator, which was located off of a service area basement corridor. In the U.S. sharps containers are collected within the facility and either treated onsite with an autoclave or more often shipped to a medical waste treatment facility where it is treated by autoclave or less frequently by incineration.

The handling of medical waste of all kinds in the U.S. is clearly defined under the Occupational Safety and Health Administration Blood Borne Pathogen standard that proscribes requirements to protect workers from exposure to blood and body fluids and especially punctures from contaminated sharps. In addition, there are very specific and stringent requirements for the proper identification, packaging, labeling and shipment of all types of medical waste by the Department of Transportation. The general rule is for sharps and medical waste to be rendered "non infectious" and "unrecognizable". Some state regulations are even more specific and proscriptive than federal regulations.

Not long ago, many if not most U.S. hospitals operated their own incinerators and were largely unaware of the pollutants, particularly mercury, heavy metals and dioxins that were being released into the environment and that ironically were negatively affecting the health of the communities they were pledged to serve. Now hospital operated incinerators are almost completely eliminated with some facilities opting to operate autoclaves to treat medical waste while most have chosen to contract with medical waste treatment companies. Because of the regulatory requirements and also the risk of untrained people handling untreated sharps once they have left the control of the facility, land filling of untreated sharps does not occur in the U.S.

The project team provided some figures on sharps injuries on the Salvador Infante site and they were found to be remarkably low in comparison with equivalent North American hospitals. It appeared that there was a very good reporting system in place with forms used to record workplace injuries and follow up of injured employees though it was unclear how consistent injury reporting was for the entire complex. During our discussions concerning medical waste it was pointed out that statistically injuries are very low, and that only two reported sharps injuries were related to waste handling because of improper disposal of loose sharps directly into a waste container.

These statistics tend to support the viewpoint that the added expense of implementing the U.S model for treating sharps will not improve safety or reduce injuries. It also became clear during our discussions that staff was not completely sure how the waste was handled once it was in the compactor truck, whether the waste from the complex was handled any different or taken to a special landfill cell, if the waste handlers knew that the waste contained sharps and if they had received any training for properly identifying and handling sharps. They also indicated that there was no mechanism to discover if any of the city waste handlers had ever been injured by sharps loose in the truck or by people that repair compactor trucks. It is clear that the safety boxes and even the tin containers are not designed to survive compaction and almost certainly occasionally burst and spill their contents into the compactor truck. In the U.S. this would be considered an unacceptable risk from a risk management and regulatory standpoint.

A current development in North America and other countries is the growing market share of companies offering reusable sharps container services. Under this type of service the vendor supplies the containers to the facility and takes full containers to their facility to be emptied and disinfected for reuse. The sharps are autoclaved and disposed of. Often the vendor is in a partnership with a medical waste treatment facility. The partnership then is able to treat all medical waste generated by the customer. This scenario eliminates the possibility that sharps could be released during handling with the regular solid waste and assures that trained service providers handle sharps in secure containers. Daniels Sharp Smart system is located out of Australia and is gaining market share in the U.S. If the Ministry of Health should decide to require the treatment of sharps before disposal this may be a good low cost option. In that case the PPP should attempt to attract a consortium partner to provide this service along with other medical waste treatment services. A partnership between Daniels and Procesan is a possibility worth exploring.

At all locations blood and body fluids and small tissue samples and waste were aspirated or decanted to the sanitary system. This is a widely accepted practice and wastewater treatment systems are designed to safely process organic wastes. A medical waste disposal firm was used to manage larger tissue waste, limbs, organs and other pathological waste as well as cultures and stocks of infectious agents. Chemotherapy is also managed as a separated waste stream and sent to the waste vendor for proper disposal.
In preparation for our visits a document entitled "Hospital Waste – International Regulations for its Management" was provided to us. The document described the deficiencies of regulations addressing national solid waste policy and the lack of any specific regulations regarding medical

waste. The document also described medical waste regulations in many countries in South, Central and North America as well as Europe.

In the current regulatory environment consistent management of medical wastes in Chile will probably not be possible. The document also indicated that the Ministry of Health is responsible for developing environmental regulatory requirements including solid waste and medical waste requirements. Until those regulations are formulated and adopted the Ministry of Health could require specific requirements as a matter of policy and procedure in facilities operated by the Ministry. Because of the risk of allowing untreated sharps to leave control of the facilities to be handled by untrained people at the very least the Ministry should adopt a policy for the proper handling of this dangerous waste stream to assure that it is disposed of in such a manner that no one is unwittingly exposed to sharps injury. This will require that sharps be segregated from the general waste stream and handled separately for disposal assuring safety all the way through final disposal. This could take the form of a requirement to contract with an outside firm for treatment and disposal or the less expensive option would be to contract with a company to dispose of the sharps at the landfill. .

Recommendation: The Ministry of Health should develop and implement policy and procedure addressing the proper handling of medical waste in public health facilities. The policy should specify that sharps be kept separate from regular waste and should be disposed of by an outside contractor. It will have to be decided by the Ministry if the waste should be treated before disposal. In any case the current practice of disposing of sharps along with general waste in compactor trucks should be discontinued.

Recommendation: It is strongly recommended to close the incinerator at the Concepcion location as soon as possible and contract for proper disposal of medical waste.

Hazardous Chemical Waste

During our visits the teamed examined some but not all hazardous chemical waste streams. We found that there were varied methodologies for disposal of hazardous materials and waste.

In the Salvador Infante Radiology, it was noted that spent fixer was collected in barrels that were collected by a contracted service provider that performed silver recovery offsite while at Concepcion and other locations spent fixer was discharged directly to the sanitary system. In the U.S. there are strict limitations on the discharge of silver to the waster stream and hospitals are often required to monitor wastewater to check for silver levels and other hazardous pollutants. In many cases North American hospitals use onsite silver recovery systems to remove silver from the fixer waste before discharge to wastewater. The contractors that perform preventative maintenance and repair on film processors often provide this service. The silver is worth money and hospitals are rebated for recovered silver or the rebate is applied against the service bill reducing costs for maintenance and repair. All hospitals should explore this option to reduce the requirement to store barrels of spent fixer for offsite recovery and to avoid discharging this heavy metal to the sanitary system. Discarded radiology films should be managed for silver recover as well to offset the costs of disposal. It is recommended that imaging services move to laser imaging and PACS digital imaging storage to eliminate wet chemistry and film disposal issues altogether in the new facilities where ever possible.

It was noted that Clinical Labs were a decentralized operation on the Salvador Infante campus resulting in inconsistent procedures for handling hazardous waste in the various facilities located in the complex. In many cases the vendor Procesan was contracted to manage some of the waste streams but in some instances flammable hazardous wastes such as alcohol and xylene were poured down the drain. *This practice should be discontinued immediately wherever it is occurring and these waste streams should be collected and managed as a hazardous waste with a qualified hazardous waste disposal company.* It is an acceptable practice to discharge formalin to the wastewater stream in small amounts.

It would be prudent to form a team from all the lab locations at the Salavdor Infante complex to identify each hazardous waste stream and develop a management plan for each and contract with qualified hazardous waste disposal contractor under a comprehensive contract for the entire site. This same team could also be charged with the task of exploring best practices for their discipline and begin to redesign processes to eliminate hazardous materials and occupational hazards and select the equipments to be purchased for the new facility. The results of this work should be shared with the facility design team to assure that facility design supports the redesigned processes and that proper requirements for design and equipment procurement are placed in the TOR. A lab work group can be formed to consider similar issues at the Concepcion hospitals.

The utilization of all hazardous materials and the resulting waste they generate should be evaluated at all locations. Work processes and waste management practices should be examined to determine environmental risks. New processes that eliminate the use of hazardous materials or better manage wastes should be implemented. This is work that can begin immediately. Assure that the facility design supports any new work process design and the TOR incorporates equipment specifications.

Recommendation: Consider onsite silver recover at all wet chemistry film processors at all sites. Specify dry imaging technology and PACS storage and display technology in the TOR to eliminate wet chemistry processing and film storage and disposal issues.

Recommendation: Discontinue the practice of dumping flammable solvents to the sanitary system. Work groups should be formed to consolidate policy and procedure for the management of hazardous materials and wastes in the lab areas in all facilities. Start to redesign clinical lab work processes and share results with the design team to assure facility design and equipment procurement supports new processes in the TOR.

Recommendation: A facilities team should be formed at both the Salvador Infante complex and Concepcion to examine current work processes that use hazardous materials or generated hazardous wastes. New work processes should be developed to eliminate hazards or effectively manages hazardous wastes. New process design should be incorporated into the facility design and equipment specification for both projects.

General Waste and Recycling

At Salvador Infante general waste is managed more or less the same at each facility. Housekeeping collects the wastes that are transported to a holding area and placed in carts supplied by the municipality. The city then collects the waste in compactor trucks for transport to the landfill.

At each facility there is an area where carts are consolidated for pick up. Once again it was clear that at all the facilities that we visited the volume of waste was much less than what would have been generated at comparable healthcare facilities in the united States. Generally the carts were cleaned irregularly and some were in poor condition. At the Torax facility, the carts are kept in an unsecured outdoor area and they had suffered a fire in the carts, probably from a careless smoker.

An interesting evolution has developed at the Salvador Infante complex regarding recycling. Evidently recycling just happens through staff and housekeeping collecting recyclable materials and selling it for money for staff celebrations or simply because there is value to the materials. I saw very little cardboard or paper in the trash. It is recommended that the complex collect recyclable materials to help offset costs for other waste management functions. At the Concepcion location there is an active recycling program that appears to be very effective and recovers a significant portion of the waste stream for recycling which returns some benefit to the organization in the form of rebates.

At all locations teams should be formed to look at the waste management at the facilities and begin to design new processes to consolidate waste management functions into a comprehensive program. An example of program redesign would be to explore the possibility that the city would provide a compactor for all general waste for the entire Salvador Infante complex. This will save the city or the subcontractor a lot of money and the city or the subcontractor should readily agree to such an arrangement if they have the ability to provide the service. The new waste processes should be shared with the design staff to assure that facility design supports the new process and adequate space is located in satellite collection points to isolate and separate the various recycling streams. It is also important that the endpoint waste collection area at both the each project location provides adequate space to stage transport carts, collect recyclable materials and includes dock space for shipping materials off site. These requirements should be placed in the TOR and construction bid documents.

Recommendation: Form teams at both the project sites to begin redesigning waste management processes into a comprehensive waste and recycling program. Process requirements need to be shared with the design teams to assure that facility design supports new processes. Assure that adequate space is allocated for the proper separation of recyclable materials at the point of generation. Assure that sufficient space is allocated for a central waste management area to wash carts and collect and ship recyclable materials.

Recommendation: Consider exploring the possibility of using large compactors to manage solid waste in a more efficient manner.

NEW EQUIPMENT IMPACT ON ENVIRONMENTAL SAFETY AND HEALTH

Over the last decade tremendous strides have been made in identifying hazards associated with equipment. For example, mercury column sphygmomanometers, mercury containing fever thermometers and lab instruments, esophageal dilators and other such equipment are increasingly becoming a thing of the past, with highly effective and inexpensive non-hazardous alternatives available.

Increasingly, the healthcare environment is becoming a digital interface with many types of patient care equipment designed to interconnect and work together to gather information (temperature, blood pressure, heart rate, blood oxygen and EKG tracings) and display in an organized manner (patient monitors and telemetry). In the digital age hazardous materials are used less and less and the requirement for the TOR should be the selection of equipment that eliminates the use of hazardous materials and encourages interconnectivity.

Clinical lab processes are becoming more automated, requiring less use and storage of chemicals. New generation tissue processors increasingly use preloaded cartridges eliminating the mixing or handling of many chemicals. Many labs now use fractional distillation solvent recycling equipment that greatly reduces the purchase and storage of xylene and alcohol resulting in savings that cover the investment cost within two years. The TOR should require the selection of equipment that eliminates chemical hazards and wastes.

Wet chemistry film processing and the storage and eventual disposal of x-ray film are quickly becoming obsolete practices. Most hospitals are now converting to laser imaging and digital film storage and display. The TOR should specify laser imaging and PACS storage and display technology to eliminate film processing chemical use and storage, heavy metal contamination of wastewater and storage and disposal of films.

Recommendation: Specify the purchase of mercury free analog or digital patient temperature and blood pressure devices. Evaluate and promote the interconnectivity of digital medical equipment of all kinds as described in the Medical Equipment consultant report.

Recommendation: Specify the purchase of Clinical Lab processors and instruments that eliminate or reduce chemical use as determined by process design and improvement by Clinical Lab staff. Specify equipment and instrumentation that utilizes mercury free products.

Recommendation: Require in the TOR that space be designed and equipment purchased to implement a solvent recovery and recycling program.

Recommendation: Specify the purchase of dry imaging radiology equipment and PACS storage and display of diagnostic imaging as specified in the Medical Equipment consultant report.

ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)

Once the new facilities are constructed, it is important to establish a system to maintain the highest standards of environmental performance. Across the world an organizational environmental management system has become an integral component of business operations to assure environmental regulatory compliance and to recognize, eliminate, minimize or control environmental risks. A sound organizational program to manage environmental issues has proven to provide a safer workplace, minimize the potential to release pollutants, protects the community and population nearby and greatly reduces costs.

Many organizations use the Environmental Management System standard developed by the International Organization for Standardization (ISO). The ISO 14000 EMS standard has been widely adopted by industry and is increasingly being adopted by healthcare facilities. The ISO 14000 standard contains the following requirements:

- Requires the establishment of an organizational Environmental Policy
- Requires the organization to identify the aspects of its operation that impact the environment
- Requires the organization to maintain regulatory compliance
- Requires the organization to utilize a Quality Improvement Process to continually examine organizational processes and identify and eliminate or reduce environmental risks
- Requires a document control system

The standard contains provisions for a certification process but it is not necessary to certify an EMS for it to be effective. The adoption of the ISO 14000 standard or a similar organized environmental management system for new Ministry of Health facilities is an excellent method to assure environmental excellence and performance while helping to control operational costs. The ISO 14000 EMS International standard can be found and purchased at http://www.iso.org.

Recommendation: Once construction is completed, the Ministry of Health should consider the implementation of an Environmental Management System in accordance with the International ISO 14000 standard or an equivalent environmental management system.

NEW FACILITY IMPACT ON LOGISTICAL PROCESSES

The design and construction of new facilities is a rare opportunity to fully evaluate current logistical processes and activities. Too often facility design is driven by a perceived need to accommodate current logistical practices or processes when ideally the focus should be on developing efficient processes, logistical pathways and patient care models, then design the facility to incorporate and fully implement those process improvements.

Separation of Logistical and Patient Care Pathways

During our visit we observed many instances where logistical pathways intersected and interfered with patient care pathways. In modern healthcare facility design the standard of care is to separate these pathways as much as possible by grouping facility services such as materials management, pharmacy transport, linen transport, waste management and food services away from the patient care areas. Placement of clean and soiled rooms in the patient care areas ideally should be on corridors where the movement of patients and patient care activities do not occur. Elevators often become the area where logistics and patient care activities or transport conflict, and every effort should be made to dedicate separate elevators to either patient care or logistical and facility support functions and activities. During our visit to Concepcion it was clear that much thought had already been given to these issues during the development of the design for the new construction. In an ideal scenario, elevator functions can be further divided into clean and soiled activities with pharmacy, clean linen, medical supply transport and food services designated for specific elevators while waste management, maintenance and house keeping activities and soiled linen transport are likewise confined to dedicated elevators. This is not required however if procedures are in place to keep clean and soiled materials from occupying the same elevator at the same time and food service products, pharmacy items, medical supplies and clean linen are transported in closed or covered carts or otherwise protected from contamination.

In many healthcare facilities there is often not enough space dedicated to shipping and receiving activities, providing only an undersized dock that has to accommodate the handling of food service supplies, medical equipment, pharmaceuticals, clean and soiled linen and sometimes even waste management functions, thus creating a logistical bottleneck and potential for improper separation of incompatible logistical streams. The Salvador Infante project presents an ideal opportunity to ensure that the shipping and receiving function is carefully considered during design planning to provide adequate space for this critical function and ensure that the proper separation of logistical streams are maintained. Many recently built facilities often have a separate dock for food service deliveries and waste management activities are always completely separated from other shipping and receiving functions.

Recommendation: Require the separation of patient and logistical pathways to the extent possible in the TOR for the design of Salvador Infante project.

Recommendation: Require the separation of waste management activities from the shipping and receiving areas.

Recommendation: Consider requiring a dedicated food service dock in the Salvatore Infante project.

ELIMINATION OF DUPLICATED LOGISTICAL SUPPLY SERVICES

During the second visit much time was spent tracing the logistical pathways for general supplies, medical supplies and pharmacy within Salvador Infante, the Torax Institute and the Neurological

Institute. Each facility had their own services dedicated to each of the respective facilities duplicating supply services across the spectrum. Combining purchasing, storage and distribution systems to encompass the entire complex presents an excellent opportunity to reduce costs and gain operational efficiencies.

Clearly these logistical systems offer an attractive opportunity to the concessionaire to provide these services and products to the complex. This offers the opportunity to Centralize these activities and functions in an onsite distribution center owned and operated by the consortium on land purchased from the Ministry of Health. This sort of arrangement will greatly reduce the space needed within the new hospital and the institutes for supply logistics, to smaller staging areas and localized storage rooms for "just in time" delivery of supplies of all kinds directly to the point of patient care delivery and the various support departments.

Currently, with the some exceptions, the general process is for each department requiring supplies to use manual supply order forms that are delivered to the respective supply rooms or "warehouses" of each facility for each type of supply stream. Once the warehouse receives the order, the order is filled and the ordering department is notified their supplies are ready. The department then sends someone to bring the supplies back to the department for use.

It was noted that the pharmacy distribution system at each location was responsible for many supplies other than pharmaceuticals such as chemicals for the clinical labs, and other supplies such as syringes, gauze pads, bandages and what were termed "medical supplies". At Salvador Infante the pharmacy management was piloting the Pyxis pharmaceutical distribution system and it was indicated that it was hoped that this or a similar computerized pharmaceutical inventory and distribution system would be implemented at Salvador Infante.

The model for supply logistics in North American Hospitals most often falls into four categories

- Pharmaceuticals
- General and Medical Supplies
- Linen and Laundry
- Food Service Supplies

In North America the pharmacy has responsibility for pharmaceuticals and not for other supplies. Increasingly Pyxis or a similar pharmaceutical distribution and inventory systems are utilized to manage this high value supply stream. The main inpatient pharmacy is responsible for compounding IV drugs, prepares chemo drugs and maintains a supply of all the pharmaceuticals for the complex and operates the distribution system to all patient care areas. The end user distribution points usually have a par level system and the computerized system generates the order to pharmacy for what items need to be replenished while assuring that patients are charged for those drugs used in their treatment.

Often large healthcare organizations utilize a professional materials management department for most other supplies which include medical supplies like dressings, syringes, bandages, patient care supplies as well as chemicals, cleaning supplies, paper products, forms and other departmental supplies. This system requires the establishment of a central warehouse that serves the entire complex. Ordering and distribution uses a central ordering system which can be a computerized web based system that each department uses to order their supplies on a par level system, or the Materials Management department generates the departmental order based on information gathered by their staff at the end point location, or a combination of both.

Linen and Laundry services will continue to be a contracted service at the complex. In large complexes linen can be handled completely separate as a logistical stream with space and staff dedicated to managing linen and laundry deliveries and returned soiled linen. In many organizations the delivery of clean linen to the end users and the collection of soiled linen for shipment is a function of a consolidated Materials Management department.

Food service supplies are best kept as a separate supply stream ordered, stored and managed by the food service department. The exception would be canned and dry goods delivered to patient unit pantries, which can easily be managed by a central Materials Management department as part of the par level supplies to the unit.

These supply functions are very attractive as revenue streams for the concessionaire consortium and will almost certainly be part of the structured agreement. This is also an opportunity to reduce the amount of space dedicated to supply logistics in the new complex. The TOR should require that the consortium operate their own warehouse on site to house these central supply functions which means that only smaller staging areas and store rooms will need to be designed into the new facility which the supplier will need to be kept stocked to par levels on a frequent basis.

During interviews with some of the managers currently responsible for the supply functions at all the various facilities, it was clear there was some anxiety concerning the new facility and the possibility that there operations would be eliminated or replaced. As is natural in the face of potential change, the reaction is to look for ways to somehow maintain the status quo. We would suggest that a more constructive and successful strategy would be for the leaders responsible for these supply functions begin to meet with their counterparts at all the facilities to begin researching best practices and start designing the most efficient models for consolidated supply logistics across the complex. This will help immensely with the facility design considerations while positioning themselves and the current departmental staff to become the core of any new logistical system operated under the concessionaire. It could easily become a requirement of the concessionaire agreement to utilize existing staff in any new system. The concessionaire partners involved in supply logistics would most likely welcome experienced staff that have worked hard to improve logistical processes to assure a smooth transition.

Under the system envisioned above, it will be critical to design adequate space for shipping and receiving, cart staging and marshalling of supplies and carts. Shipping and receiving area with space dedicated to each logistical stream and an adequate number of dock spaces will be key in this design. It is recommended that food service have a dedicated dock. Waste management functions should never be handled on the same dock as supplies and food service and should be located elsewhere.

Recommendation: Determine if pharmaceuticals and the pharmacy operations will be a part of the concessionaire agreement. Narrowly define the products that Pharmacy will be responsible for procuring and distributing to pharmaceutical items and drugs.

Recommendation: Form working groups to research best practices and develop new consolidated logistical processes for the entire complex. Determine what supplies will be handled by each department. Share consolidated logistics plan with the facility design team so that storage, distribution and logistical pathways can be considered and accommodated in the new facility design. Require that the concessionaire partners selected to provide supply logistics utilize existing staff in the logistical supply system across the Salvador Infante complex.

Recommendation: Consider the establishment of a Materials Management Department to serve the entire Salvador Infante complex, which will be responsible for all logistical streams except for pharmaceuticals and food service supplies.

Recommendation: Select web based or internal computerized ordering systems to better manage supply costs and record keeping. Consider a consolidated pharmaceutical inventory and distribution system such as Pyxis to accurately manage costs, utilization and charges to patient accounts.

Recommendation: Assure that adequate dock space is designed into the facility to accommodate all the various services and supplies delivered to the complex. Provide space to keep supplies and soiled linen apart separate. Consider keeping food service supplies completely separated from the other logistical streams and designate the food service concessionaire partner to manage all food service supplies. Assure that waste management functions are kept separate from the shipping and receiving area.

CONCLUSION

The Chilean Ministry of Health has the opportunity to make a quantum leap to modernize their facilities, upgrade equipment and diagnostic capabilities, implement information system technology and dramatically reduce the environmental footprint of the healthcare industry through the proposed Public/Private Partnership model. The new improved healthcare model in Chile will help the ministry meet the very aggressive goals of the AUGE legislation by introducing upgraded capabilities and efficient patient care methodologies.

The Trinity International team was impressed by the dedication of the project team to the PPP model and excited at the opportunity to be involved in a project with such potential to improve the healthcare in Chile. It is hoped that the observations and recommendations made by the Trinity team will go far toward realizing the vision of the Ministry and the goals of AUGE.

WEB LINKS

National Fire Protection Association
http://www.nfpa.org

U.S. Environmental Protection Agency / Hospital Pollution Prevention
http://www.epa.gov/Region9/cross_pr/p2/projects/hospart.html

Centers for Disease Control
http://www.cdc.gov

International Organization for Standardization
http://www.iso.org

U.S. Green Building Council
http://www.usgbc.org

American Society of Healthcare Engineering
http://www.ashe.org

Green Guide for Health Care
http://www.gghc.org/

Hospitals for a Healthy Environment
http://www.h2e-online.org

Healthcare Without Harm
http://www.noharm.org

Sustainable Hospitals Project
http://www.sustainablehospitals.org/

C. Information Technology Component

BACKGROUND:

The Trade and Development Agency (TDA) Project Report dated 2 February 2004 and titled "Definitional Mission for Renovation of Hospital Salvador and Other Health Sector Projects in Chile" described the proposed project information technology (IT) components as follows:

- Identify the particular technology needs in information technology that would be required to implement new clinical management systems the best way possible under the circumstances in existence.

- Identify the principal obstacles including the absence of adequate IT- based systems to the cost effective and efficient administrative management and operations necessary to maximize and optimize health care delivery.

- Develop and propose an IT-supported system able to:
  - Collect and analyze clinical information
  - Create an integrated database
  - Provide for administrative functions such as cost accounting, purchasing, inventory, distribution of supplies, medicine and other consumables appropriate to the needs and capabilities of each institution.

On the level of the Ministry of Health, provide recommendations on "model" management systems potentially applicable throughout the FONASA network, based on the analysis of the IT supported systems for the Salvadore and GG Benavente Hospital complexes, as input to the current incipient IT-planning projects.

FINDINGS AND OBSERVATIONS

In presentations, Ministry of Health officials, including the Minister of Health, outlined a vision for the role of IT in the health care reform process, and in the two construction projects about which THI is advising the ministry. Key elements of this vision include:

- The process of planning and implementing appropriate IT support for the projects in Santiago and Concepcion will likely become a model for other projects throughout the country.

- IT systems should provide the data necessary for local officials and the Ministry to perform audits and analysis to understand and improve outcomes and resource utilization. The Ministry of Health is currently in the process of defining more specific data collection and reporting standards, concentrating on Human Resources and Financial information. The AUGE System will drive requirements for the collection and reporting of Patient management and Administrative information.

- Telemedicine capabilities enabled by IT systems and network infrastructure have the potential to provide less-populated areas of the country with access to the clinical expertise available in metropolitan areas such as Santiago and Concepcion.

- Rules and alerts should be implemented to communicate and enforce best practices identified throughout the system.

In meetings and presentations coordinated by Mr. Luis Osorio, we were able to review the existing IT infrastructure for the Salvatore Infante complex and the process currently being used to document and redefine key administrative and clinical processes in preparation for the selection of appropriate applications to support the complex. Key observations from this process include:

- The preferred deployment method for the IT solutions, both in Santiago and in Concepcion is on an ASP model, which would include all necessary applications and which would also have implementation costs loaded into the monthly fees.

- The Eastern Oriente district is currently using a web-based application that provides the function of patient registration, verification of public health system coverage, referral management and appointment scheduling. This system has evidently been very well received by patients and primary care physicians.

- Key application areas to be automated, both in Santiago and Concepcion, include the implementation of a Computerized Patient Record, Clinical Documentation, Pharmacy, Laboratory, Radiology applications, logistical applications such as Materials Management, Financials and Human Resources, Cost Accounting and Decision Support Systems.

- Within the Salvador-Infante complex, a consulting engagement to identify and document patient flow processes has been recently completed in preparation for the IT system selection and implementation. A similar project covering clinical and patient care processes is in the planning stage. In addition, a similar project covering patient flow and clinical processes for the orthopedic hospital in Concepcion has begun, and the expansion of this engagement to the regional hospital is currently being negotiated with the consultants, Altos-Origin. The initial deliverables from this engagement have been well received by the steering committee and would appear to provide the basis for identifying the key process changes and automation priorities that will be needed as the project moves on to the implementation phase.

- There is reasonable deployment of IT infrastructure, particularly within the administrative areas of the Salvador-Infante complex and within the Thorax Institute.

- In clinical areas particularly, the introduction of the kind of sophisticated IT applications under consideration will involve a high level of change management, training and cultural integration among the four facilities. Our observation is that the success of the IT component of the project depends in much greater measure on the management of change and organizational culture than it does on the selection and installation of software, hardware and infrastructure. During the second visit to Chile, we presented several briefings on Organizational Readiness, a project management process designed to help hospitals manage and monitor the transitional and cultural aspects of a major system implementation. These presentations were well received by project team members and management teams, both in Concepcion and Santiago.

- It appears to be the intention of the Ministry of Health to include the implementation of new IT systems in the Public-Private Partnership arrangement that will be used to fund the construction of the renovations to the Salvador-Infante complex in Santiago, but the project will be funded on a more traditional basis to support the Concepcion facility. The selection of different software solutions to support the Salvadore-Infante and Concepcion facilities has not been ruled out.

RECOMMENDATIONS

The TDA Project Report calls for recommendations on IT-supported systems and model management systems. Key action areas for THI in the area of Information technology included the following:

Input to the Terms of Reference for the selection and implementation of IT systems.

Based on the desire of the Ministry to deploy systems on an ASP model, the Terms of Reference should address the following points:

- The alignment of incentives between the Hospital complexes and the ASP partner is of critical importance. The Terms of Reference should synchronize the level of monthly payments with the actual applications being used by facility or department, so that the partner is motivated to move the implementation along at an appropriate pace.

- While the project team will be working to standardize processes and forms wherever possible, the application must be able to adapt to different formats, rules and work flows at different facilities. This issue is particularly important if the system is expected to be offered to Health Ministry facilities outside the scope of the current project, or to private providers.

- The partner(s) selected must have experience in deploying a major application on an ASP model and have experience implementing its applications in a major international setting similar to the Chilean system. These criteria may limit the field of prospective vendors to major players such as Siemens and Cerner for clinical applications and PeopleSoft and SAP for ERP applications. However, the business case for "world-class" applications in support of the ERP business processes is not as obvious as that for the clinical applications. The selection of the vendor solutions for the ERP applications should be driven by relatively detailed system and user requirements, the result of which could be either a "world class" solution or a solution from a national or regional supplier that also meets or exceeds the established requirements. It should be noted that the execution of this strategy carries with it a level of risk that can only be mitigated if the definition of requirements is thorough and complete and not only includes current needs, but anticipates future requirements as well.

- Strong consideration should be given to having key members of the project team visit at least one or two sites in the United States, Canada or Western Europe that have implemented IT solutions from each of the finalist vendors to help identify the impact of the implementation on patient care and administrative processes. Some examples of relevant sites would include the University of Pittsburgh Medical Center in Pennsylvania, the University of Illinois at Chicago Medical Center, and the University of Cincinnati Medical Center in Ohio.

- The number of IT applications that are planned for the projects is substantial. The Terms of reference should prioritize the implementation by application cluster and solicit the input of the vendors regarding the optimum implementation sequence.

- Implementation strategies for Hospital Information Systems can vary widely and the Terms of Reference should be specific in terms of expectations for the vendor. The participation of the vendor project manager in the local steering committee and readiness team, an understanding of the user training strategy, and the level of support during go-live events are examples of factors that need to be included in the Terms of Reference.

- In order to take advantage of economies of scale, the Ministry should give strong consideration to making the IT applications available throughout the public health system to leverage the benefits of the technology and to spread the fixed costs among a larger group of users. Additional revenue could be gained by providing service to private health care providers.

- In addition to the inclusion of the IT solution in the Public Private Partnership (PPP) for the Santiago project, the Ministry might choose to evaluate whether to undertake the ASP initiative on its own or in direct partnership with a software vendor to widen the potential deployment and to help standardize the use of the technology throughout the national health system.

Recommendations concerning IT planning and implementation issues.

- More than any other factor, the management of change and the inclusion of the widest possible number of stakeholders in the implementation and planning processes are critical success factors for the IT solutions.

- During the second visit to Chile, we presented several briefings on Organizational Readiness, a project management process designed to help hospitals manage and monitor the transitional and cultural aspects of a major system implementation. The Appendices to this report include the presentation materials and examples of some of the tools used in the Readiness process.

Examples of several communications models to help the project team communicate key application architecture concepts to sponsors and stakeholders were introduced during the second visit to Chile. These models are designed to help in determining the level of process and system standardization that is desirable and/or achievable. In addition to their usefulness as a communications tool, tools such as those included in Appendix C will be helpful for the project team in documenting the existing and projected application architectures at each of the facilities. A detailed understanding of the applications currently in use is critical to the process of developing conversion plans, interface requirements and implementation plans. We recommend that the inventory of existing applications at each facility, along with key data flows between applications, be documented using a consistent and standardized format prior to the finalization of the terms of reference for the implementation of the clinical and ERP systems.

- The participation in the project by end users and department managers in the project is critical to its success. It is important that the opportunity cost, overtime cost and replacement costs related to this level of participation be accounted for in the project budget. In a project of this scope, these costs can be expected to be substantial and user departments will likely need some level of budgetary relief if they are expected to provide dedicated resources to the project.

- Strong participation by all stakeholders in discussions concerning process analysis and the degree to which various administrative processes should be common among the various facilities is critical and will require significant attention by the sponsors and the project team.

- In conjunction with the replacement of the orthopedic hospital in Concepcion, a process analysis project has been undertaken that could very well form the model for similar work on behalf of the Santiago project. Since this project happens to be running concurrently with the THI engagement, we have been asked by Luis Osorio to participate on the Steering Committee.

WORK IN PROGRESS AND EXPECTATIONS FOR THE FINAL VISIT.

1. While we have identified some preliminary sites, we are continuing to contact software vendors and other sources to identify relevant site visit locations for members of the Chilean I.T. team to observe successful implementations of applications such as the ones being planned.

2. During the second visit to Chile, we were able to review in some detail the proposed Nursing Management model, which provides important insight into key clinical and administrative processes. While we had hoped to gain a more detailed understanding of the existing processes in place for creating and managing clinical information (medical records), the gap does not affect our recommendations, other than to advise the project team to review this area carefully for opportunities to reduce the variation in practice within the complex and assure a smooth and efficient automated process.

Some preliminary cost assumptions for the Santiago I.T. project were shared with us for comment during the second visit to Chile. Some informal comments were shared with Mr. Osorio with an expectation for a follow-up conversation during the final visit.

CONCLUSION

The construction and renovation projects currently being undertaken in Santiago and Concepcion provide a unique opportunity to deploy up-to-date information technology in support of rationalized administrative, management and clinical processes. While the inclusion of IT infrastructure in the newly constructed and renovated facilities will be relatively straightforward, the selection, implementation and successful deployment of the applications engender a much higher level of risk and uncertainty. The highest level of management attention, both from the local administration and from the Ministry of Health, will be required to ensure a successful outcome.

D. Architectural Component

INTRODUCTION

The TDA Project Report dated 2 February 2004 and titled "Definitional Mission for Renovation of Hospital Salvador and Other Health Sector Projects in Chile" described the proposed project architectural components as follows:

In Santiago:

- "The Salvador Infante Hospital project for building and equipping a new hospital and new outpatient medical and ambulatory surgical facilities. Also the National Institute for the Thorax and the National Institute of Neurosurgery, which are in separate buildings but are part of the Salvador Hospital complex, are scheduled for renovation and equipment upgrades."

- "A small project at the Pedro Aguirre Cerda National Institute for Rehabilitation in Santiago for equipping three new surgical suites."

In Concepcion:

- " Two projects at the Concepcion Regional Health Service and hospital: the construction and equipping of a new outpatient clinic building, possibly with new ambulatory or outpatient surgery facilities; and the expansion of two regional hospitals linked to the Concepcion complex."

In on-site discussions with Ministry of Health officials and with representatives of the facilities in Santiago and Concepcion, we have determined that the actual projects underway are as follows:

In Santiago:

- The Salvador Infante Hospital project will involve the complete replacement of all its facilities on the same site with the exception of the 19th century historic chapel and surrounding core buildings, which are national landmarks. They will be restored and retained for public/community use and some administrative functions. The existing blood bank, also in the historic area, and which serves other public medical facilities in the Metropolitan Region, will be retained in place.

- The National Institute for the Thorax has recently undergone selected renovations in public and clinical areas. Future renovations as a part of this project will involve the provision of connecting links to the new Salvador Infante Hospital buildings, upgrading the vertical circulation to provide new elevators to correct the current mix of public and inpatient traffic on all floors, and converting the existing emergency and intensive care areas to other uses when these functions are decanted to the new Salvador Infante buildings.

- The National Institute of Neurosurgery is currently undergoing selective renovations, including the construction of a new surgical suite and subsequent relocation of the intensive care unit. Future renovations as a part of this project will involve the provision of connecting links to the new Salvador Infante Hospital buildings, upgrading of vertical circulation to provide new elevators to correct the current mix of public and inpatient traffic on all floors, and the converting the existing emergency and intensive care areas to other uses when these functions are decanted to the new Salvador Infante buildings.

- The National Geriatric Institute is currently in very old buildings on an adjacent site. The intention is to integrate it into the Salvador Infante complex.

  Terms of Reference for a Public-Private-Partnership arrangement for a design/build project to achieve the above goals will be developed.

In Concepcion:

- The projects are limited to those at the G.G. Benavente Hospital, and do not include the "expansion of two (additional) regional hospitals" as described in the TDA report.

  Architectural plans have been drawn for a replacement Orthopedic/Trauma Center, currently in an inadequate building across the street, and for a replacement ambulatory care center currently in substandard space in the basement of the existing building. These two projects will be connected to one another as well as the existing hospital. The majority of support services and some clinical services will be shared.

  The intention is to put these plans out to bid in June 2005 as a conventional construction project.

ON-SITE MEETINGS AND OBSERVATIONS

In presentations during the Team's first visit Ministry of Health officials made the following points which will have an impact on the architectural planning and design of new public health care facilities in Chile:

- There is a move away from the traditional Chilean separation of inpatient beds by clinical specialty. Inpatient units will be designated by levels of care, with combined medical/surgical units.
- Related to the above comment is the specific question of the quasi-independence of the Thorax, Neurosurgery, and Geriatric Institutes on the site. Ideally, these institutes should be completely integrated into the Salvador Infante complex to avoid

unnecessary duplication of administrative, clinical, and service areas, without compromising clinical excellence.
- New information technologies must be recognized and accommodated.
- Improved techniques for waste management/ sanitary technology must be developed and accommodated.
- Training and medical education components in the public health care facilities will grow in importance and appropriate spaces must be provided to satisfy these needs.
- Infrastructure to accommodate digital imaging must be provided.
- The "Family Health Model" is becoming an important driver in the way health care is delivered in Chile. This fits in with the development in North America of new directions for "Family and Patient Centered" care, which have changed not only healthcare interior design, but functional planning aspects as well.

During the Team's first visit the Ministry of Health Architects discussed the status of their programming and planning efforts relating to the Salvador Infante site. Their discussions included the following points:

- An Infrastructure Analysis of the existing buildings was made last year. It is clear from this analysis that there is little or no reason to try to save any of the existing structures (aside from the historic core buildings) other than the Thorax and Neurosurgical Institutes, which are of more recent vintage and are in much better overall condition.
- A block conceptual diagram was being developed for the proposed replacement hospital. This was to be finished in May 2005.
- A proposed construction-phasing diagram would be developed along with the above conceptual diagram.
- "Technical architectural specification standards" were also now being developed. We understood these to be similar to what we would call an "outline specification" which would be part of a Schematic Design submission.
- It was initially unclear what the status of the Functional Program and Architectural Space Program was. This will be commented upon in the following pages.

During the Team's first visit the Team met with the Minister of Health, Dr. Pedro Garcia, who outlined his vision for the design of Public Health Care facilities, which included the following points:

- Good planning can result in better efficiency of operations.
- Provisions should be made for telemedicine at Salvador Infante to support clinical activities in more remote areas of Chile.
- The concept of the use of appropriate technology should be kept in mind. Good functional technology does not need to be the latest, perhaps more expensive, gadgetry.
- Sharing of expensive diagnostic and treatment equipment between clinical disciplines is to be encouraged.

- Medical decisions and activities could learn something from the "Engineering Process".
- Hospitals must be beautiful, with not only hygienic, but also aesthetic ambience.
- Hospitals can be centers for cultural activities and events. Artworks and sculpture are important elements.

During the Team's first visit a walk-through of the Salvador Infante Hospital complex was made. Although plans call for everything except the Thorax and Neurology Institutes to be razed, the following observations of existing conditions are worth making here:

- On-going small renovation projects have been, and are being, done in order to keep up with functional needs. Work in the old two-story ward buildings to accommodate new intensive care units is currently under way. The quality of construction is good. Appropriate support services are being provided at the bedside, and cable trays are being installed in corridor ceilings. The new functional layouts are adequate, considering the difficulties of working within the confines of very old buildings which do not have appropriate structural modules for contemporary medical planning.

- A fairly new wing for private beds has patient rooms very similar to basic semi-privates, which can be found in North American hospitals today. There are complaints that the dry wall construction and low ceiling heights, compared to the old buildings, make this wing uncomfortable both in terms of ventilation and air conditioning as well as acoustics.

- The Emergency Department, which sees up to 200 cases a day, has a very large percentage of its workload (about 60%) in what we would consider less urgent or minor care, which could be handled in a "Fast Track Unit". Currently the Public Hospitals do not officially accommodate this kind of workload, or at least try to discourage it. Public primary care centers, located elsewhere, not on the hospital sites, are supposed to handle these cases. This distinction seems to exist on paper only, as these kinds of patients continue to flow into the hospital's emergency department. At the Luis Tisne Hospital, which we later visited, minor care patients are triaged, made to wait for an uncomfortable amount of time, and sent home with a prescription. This does not seem to discourage this kind of traffic in the public hospital emergency departments. This situation suggests that an administrative/clinical/functional planning solution would be to locate a primary care center at each hospital to which this category of patient could be triaged and "Fast-Tracked".

- The abundance of courtyards and semi-tropical vegetation soften the dreary aspect of the existing buildings by providing natural light and garden views. This aesthetic and sense of scale would be worthwhile trying to recreate in the new facility.

During the Team's first and second visits a series of one-day meetings were held with the Ministry architects , as well as the Mechanical/Electrical Engineers The following project planning aspects were discussed:

- Diagnosis of the Existing Structures: As previously mentioned the result of this survey confirms that none of the existing structures is worth saving except the Thorax and Neurosurgery Institutes. Mechanical, electrical and plumbing infrastructures are deteriorated. Functional layouts are inefficient and cannot be renovated to provide the proper areas to meet current medical planning standards. The historic core buildings will be preserved and restored for non-clinical functions.

- Data Gathering and Programming: The architectural team has worked with Salvador Infante administration and clinicians to project workloads for 10 years into the future and to develop projected space requirements for the various departments. Excerpts from the programming documents were reviewed and indicated that a room-by-room architectural program is being developed using more or less the same methods we would use in North America. Departmental Net Square Meters were translated into Departmental Gross Square Meters using a net-to-gross ratio that varied from department to department. THI offered to give them our versions of typical space programming methods for reference and comparison. (These are included in Appendix D.1).

- Master Site Planning: The staff is working on three alternative conceptual block diagram options showing how the entire site could be developed to satisfy the program (1)OPTION ONE uses "Zone 1", the southern portion of the site. This option keeps the two Institutes and links them to the replacement hospital complex. The result is a large block of new high-tech space located between the two institutes, with ancillary, administrative, and service blocks linked to it horizontally. A new bed tower would rise above this complex. This conceptual block diagram attempts to address the fact that the two Institutes do not want to lose their individual identities in the new plan. Each would continue to have a main entrance on the street. Each would continue to have separate surgical suites and their own acute care inpatient beds. The proposed new high-tech block would, however, have an emergency department and intensive care units serving the entire hospital complex. Central support facilities such as sterile reprocessing, materials management, food service, etc. would also serve the entire complex.(2) OPTION TWO uses the eastern portion of the site along Avenida J,M Infante. And links the replacement hospital (with the same functions described for the first option above) to the two Institutes. The result is a long linear complex which would free up the southwestern and northwestern parts of the site for other development. (3) OPTION THREE uses "Zone 2", the northern portion of the site. It also contains the same functions described above for the other options, but requires somewhat longer linkages to the two Institutes.

- Phasing of Construction: Phasing strategies, which would be required to keep the entire complex operational while constructing the replacement hospital, have been discussed The location of the replacement hospital as described above for OPTION ONE would require a temporary relocation of the surgical suite for both ambulatory and inpatient surgery, as well as the existing inpatient beds, while the construction takes place. It would also require complicated arrangements to keep various portions of the existing areas functionally linked to each other in order to keep the complex in operation during construction. OPTION TWO would require a little less complicated construction phasing OPTION THREE would require removal of some lesser functions before beginning construction, but once begun, construction would not require phasing as with the other two options.
- Analysis of Site Development Options: THI suggested using an evaluation matrix exercise to analyze the pros and cons of the three options. This exercise allowed various attributes of the site plans to be scored and compared to each other by the Ministry of Health project team, consisting of architects, engineers, administrators and clinicians. The matrix evaluated each option on the basis of five main attributes: 1) Functionality, 2)Costs, 3) Potential Profitability of the Remaining Developable Area, 4)Accessibility, 5) Aesthetic/Image Considerations. These five main attributes were further divided into sub-categories. In all, twenty-nine separate categories were scored. The result of this exercise was as follows: Option One scored 104.5, Option Two scored 85.5, and Option Three scored 130.5. Option Three, which located the replacement hospital on the north end of the site, was clearly favored. The advantages of Option Three were many, including a) no need to phase construction, thus faster schedule b) no need to relocate clinical functions temporarily during construction, c) closer accessibility to the metro and public transportation, d) construction cost savings overall, e) aesthetic advantages of park areas on the north end of the site. (Site Plans for the three options are included as Appendix D 2, and the Evaluation Matrix as developed is included as Appendix D 3.)

- Mechanical/Electrical Engineering: Engineers joined the planning team in March 2005. They have determined the mechanical and electrical systems concepts and are working out the associated space needs. The Mechanical Engineers are currently assuming fully air-conditioned buildings. Given climate conditions in Santiago, which may not require air-conditioning at all times, consideration should be given to a further analysis of which functions would require A/C at all times, as opposed to which could be on a seasonal basis and which would not require it at all. The current thinking is for 5 chillers, 5 cooling towers, and 3 boilers. Chillers and boilers could be located in a separate service building, if the site allows this possibility. Otherwise a location on a lower level, but integrated into the main hospital building would be appropriate, as long as there was ventilation and equipment access. An in-building plant location will permit the boiler stack to rise within the hospital itself. This would be a cost saving and an aesthetic improvement over the freestanding stacks a separate building would require. The cooling towers will generate noise, and care should be taken to screen them acoustically from the surrounding neighborhood. A tower rooftop location could be best from this standpoint. The Electrical Engineers are investigating the possibility of co-generation. They are also planning to distribute the incoming electric service through two to four substations. Splitting up the electrical load will allow for operational cost savings . This concept will have architectural/location ramifications for multiple switchgear rooms. A state-of-the-art uninterrupted power system (UPS) is planned. Communications and electrical closets should be programmed as net departmental space to ensure that enough area has been set aside for these functions. The merits of above ceiling versus. under floor distribution for open office areas was discussed. North American planning has observed above ceiling solutions with decorative conduit drops, sometimes built into the furniture systems. This avoids the complications of recessed structural slabs and floors. The Medical gas systems proposed would require installations in a service yard for bulk oxygen and for the possible provision of a synthetic air plant to provide high quality medical compressed air.

- Functional Programming: THI noted that the staff did not seem to have developed a Functional Program Document describing each functional entity on site, its preferred location, working relationships with other entities, its staffing requirements and other features. THI suggested that such a document is helpful as a first step in the development of an architectural work plan for the programming and planning phases of a project and offered to give them a copy of a work plan document we are currently working with. (This is included in Appendix D.4 .).

- Development of Nursing Unit and Patient Room Designs: THI participated in a planning discussion concerning these areas. Three-bedded rooms are being considered, and sketches were made during the discussions to establish appropriate dimensional modules for these rooms. North American planning standards would preclude having more than two beds on one wall. Three beds on one wall would result in the middle bed having virtually no private space. The room discussed would provide two beds on one wall and one bed on the opposite wall, giving each bed a private zone for a visitor chair, wardrobe and/or counter top. Each room would have an accessible toilet and shower room. Every two rooms would have a sub-station on the corridor for nursing, with potential viewing capability into the rooms. Nursing Units should be organized in units of 25-30 beds, with one isolation room per unit. Various configurations were sketched: square, diamond-shaped, and triangular units have all been used in North American planning and could be effective here.

- Total Bed Counts: Salvador Infante Replacement Hospital: 501,Geriatric Institute Replacement:70,Neurosurgical Institute:174,Thorax Institute:238.

- Vertical Transportation: Rules of thumb for planning lifts were discussed. THI suggested, based on experience, that a 700-bed hospital could generate a need for 12 lifts, not including dedicated lifts for central sterile supply. Requirements for the new complex could be interpolated from this, but we would recommend a vertical transportation consultant early in the planning proves to determine this. THI would also recommend providing empty lift shaft ways at each vertical circulation point to accommodate future expansion.

- Integration of the Thorax and Neurological Institutes: These Institutes want to be able to maintain their individual identities in the future development of the complex. This requirement was the original driver for the development of Option One, which, although well integrated functionally, requires complicated construction and operational phasing, and commits the Institutes to remain indefinitely in their existing older buildings. Option Three, however, provides a solution which, in the long run, permits the Institutes to be relocated into state-of-the-art new construction in a future second phase. The first phase design of the Salvador Infante replacement hospital can be planned so that the two Institutes can be "plugged in" to the complex in this second phase in such a way that their individual identities are preserved.

- Thorax and Neurological Institutes Outpatient Clinics: The clinicians at these Institutes have expressed a desire to be able to continue to operate their outpatient clinics in spaces in their existing buildings. The current thinking has been to integrate these clinics into the proposed new Ambulatory /Consulting Block with other specialties, making them somewhat more remote from the Institutes. THI suggested the following strategy to solve this problem: Inasmuch as large areas will be decanted from the Institutes and put into the replacement hospital (Central Supply, Emergency, Support Spaces, Critical care, etc.), the vacated space could be developed to accommodate expanded outpatient clinics within the existing Institutes . At such time in the future, when the Institutes can be integrated into the new hospital, these clinics could be relocated to an expanded Ambulatory/Consulting Block. This strategy would decrease the amount of new construction of this block in the first phase, but would require somewhat increased renovation costs in the existing Institute buildings. The TOR should allow for an option to include the cost of renovations in the two Institutes in the overall budget.

- Parking Garage: The total number of parking spaces required has been determined by a demand study to be 2000 (although municipal zoning would require only 750). Multi levels of parking under the buildings would be necessary to provide this many cars on site. Their construction budget estimate for this is $230/square meter. Consideration should be given to multi-level parking above grade, with an option to locate structured parking on part of the site of the existing Geriatrics Institute with bridge or tunnel connections crossing the street.

- Project Costs/Budgets**:** The staff is working with the following assumptions:

    - Total new construction area: 60,000 square meters.
    - Total project area including the Institutes: 90,000 square meters
    - Current average hospital construction costs in Chile: $1,300/square meter.
    - Current costs of surgical suite renovations in the Neurosurgery Institute: $1,500/square meter.

- Recent average inflation of construction costs in Chile: 3%/year.
- Total Project Budget is $100,000,000 to $120,000,000.

Using the above figures and our North American experience that a health care project budget is generally 40% over and above the construction budget, we can make the following calculations: 60,000 square meters x $1,300/square meter= $78,000,000, x 1.40= $109,200,000, which falls within the above stated range of $100,000,000 to $120,000,000. It should be noted, however, that although this would cover new construction, major built-in and moveable medical equipment, furniture, and design fees, it would not necessarily cover any renovation work to be done in the Institutes, any preservation or restoration work in the historic core, major site works, a parking structure above or below ground, and may not be enough to include very high cost imaging equipment which the program may call for. And should the program area go above 60,000 square meters, this project budget would have to be recalculated. Escalation at 3%/year should also considered.

It will be important to keep up-dating the project budget through the programming and planning stages right up to the time that the TOR is issued.

Site visits and discussions held at the G.G. Benavente Hospital in Concepcion.

An overall orientation was held related to the proposed projects during the initial visit to Concepcion. On a subsequent visit to Concepcion, a detailed review of the proposed plan and a tour of the existing facilities were completed. Two of the project architects, Mr. Johnny Villouta and Ms. Daniella Parra provided a detailed review of the master plan, proposed site plan and each of the six floors of the project. A follow-up meeting was held with Dr Sergio Opazo.

Because the project is so far along in the process, the focus of the review was to identify minor changes that could optimize the current design. In addition, comments related to the future phases of the master plan were developed.

THI discussed Nursing Unit design and operational issues with Ministry of Health representative, Ms Veronica Medina. The following points were raised:

- A nursing management model was developed and completed in January of 2005. The model was completed by nursing representatives from the Hospital Del Salvador, National Institute of the Thorax, National Institute of Neurosurgery, and the Outpatient Care Center. The group met weekly for a period of five months. This comprehensive document includes a section on diagnosis of current problems, a summary of the nursing mission and vision, the proposed nursing management model and the associated human resource and quality management issues.

- This document proposes staffing models for the intensive, intermediate, and medical-surgical units. The staffing ratios will assist in the architectural planning of the units.

The recommended ratios for the intensive care units are 1:3 for RNs/Techs and 1:9 for auxiliary staff. The recommended ratio for the intermediate care units is 1:6 RNs, 1:4 Techs and 1:12 auxiliary staff. This indicates that the ICU units are most appropriately sized based on multiples of 9 and the intermediate units based on multiples of 12.

- The recommendations for a medium complexity medical-surgical ward are for a ratio of 1:11 RNs, 1:8 techs, and 1:15 auxiliary staff. Therefore, the 4-bed ward model would be very appropriate for this type of unit with a total number of 32 beds.

- The low complexity medical-surgical wards have recommended ratios of 1:22 for RNs, 1:12 for techs and 1:22 for auxiliary staff. It would appear that this population would be better served by a unit of 44 beds.

- One concept that was not discussed in this document but was discussed during the on-site meetings was whether patients should be grouped by level of care (i.e., all ICU patients together, etc.) or by diagnosis (all cardio thoracic patients together, etc). Historically, in North America, all of the patients were grouped by acuity level. Over time, several issues resulted from this approach. In particular, it was difficult for the nursing staff to develop the skills necessary to care for all types of patients. With the higher complexity of many types of patients, nurses needed to develop expertise areas such as cardiovascular surgery, cardiology, trauma, etc. Second, it was inconvenient for physicians to have their patients scattered throughout the facility and it made it difficult for them to implement protocols for certain types of patients. Third, the boundaries between an intensive care patient and intermediate care patient were blurring. Therefore, it made more sense to minimize the moves of the patient and care for this type of patient on the same unit or area. It should be noted that in this model, aggregating patients by disease entity, all of the clinical (e.g., ED, OR, imaging, etc) and support services (e.g., dietary, materials management, transportation) are typically shared.

IDENTIFYING TRINITY HEALTH INTERNATIONAL ACTION AREAS

The TDA Project Report, dated 2 February 2004, included a description of the Architectural Component of our report as follows: "Evaluate Current Architectural Plans, Determine the Extent to which They provide the Specifications to Meet the Technological Needs for the New Facilities to Develop the Higher Levels of Clinical Care and Diagnostic and Therapeutic Technologies Contemplated; Recommend Needed Revisions."

Our on-site visits and discussions revealed that the status of the current architectural plans for the Salvador Infante Hospital complex in Santiago are quite different from those for the G.G. Benavente Hospital in Concepcion. The Salvador Infante planning is in an early stage of program definition and site conceptual block diagramming leading up to a late 2005 selection of a consortium to deliver a design/build project in a Public-Private

Partnership with the Ministry of Health. The Concepcion planning is in the very last stage of the preparation of contract documents to be bid in mid 2005 as a conventional construction project. For these reasons, **we believe the Trinity Health International architectural consultation required at this time can be divided into three Action Areas:**

- **Action Area One**: Advising the Ministry of Health on the architectural programming and planning aspects involved in the preparation of Terms Of Reference (TOR) which will define the Salvador Infante project.

- **Action Area Two**: Contributing to the Ministry of Health our observations and suggestions about specific medical planning and design issues so as to share, as appropriate, our North American experience and standards with our Chilean counterparts.

- **Action Area Three**: Reviewing the detailed construction documents which have been prepared for the expansion and renovation of the GG Benavente Hospital in Concepcion.

Action Area One Details: The Terms Of Reference for the Salvador Infante Hospital project should include the following:

- Functional Program Narratives: Each Functional Entity or Department in the complex should be described in a format which includes programming assumptions:
    - philosophy of operation,
    - projected workloads,
    - projected staffing,
    - relationship to other Functional Entities,
    - relative importance for expansion in the future, and
    - any other special features which would define the program.

- Architectural Space Program: Based on projected workload and staffing, Functional Entities or Departments would be assigned a room-by-room list of spaces within them, described in net square meters, to be multiplied by a net-to-departmental gross factor to arrive at Departmental Gross Square Meters (DGSM) for each. The Consortium planners would be permitted to deviate plus or minus a certain percentage for each space, this percentage could be in the range of 5% to 10% and should be further discussed by Ministry of Health planners. If the deviations are more than those ranges, they should be justified by the Consortium planners on a case-by-case basis. Total Building Gross Square Meters would contain all DGSM area, including major Mechanical/electrical Spaces multiplied by a factor (usually x 1.15 to 1.20.) to account for intra-departmental circulation, exterior walls, canopies, vertical circulation, etc. (As an alternative to simply accepting and working with the Ministry of Health space program, the consortium planners could be requested to go through a "review and confirmation" of the Architectural Space Program with the user groups.

This would affect the cost of their proposals. Requiring this extra step could be justified if there were to be significant construction or operational cost savings from the Consortium's revised program suggestions.).

- Blocking and Stacking Conceptual Diagrams: A number of alternative diagrams will have been considered by the Ministry of Health architectural team. Three different options have been selected for further analysis. Only one of these options will be chosen to be developed by the Consortium. This diagram will show current thinking of the Ministry of Health planners in terms of how the site could be developed and the vertical and horizontal relationships between Functional Entities, including the existing Thorax and Neurosurgery Institutes. The diagram will include site circulation and parking requirements.

- Phasing of Construction: The selected Blocking and Stacking Conceptual Diagram will have construction phasing implications. A strategy will be described in narrative and/or diagrammatic format to describe current thinking of the Ministry of Health planners on this issue, including alternative strategies for temporary relocations of existing functions as required.

- Required Planning and Design Disciplines on the Consortium Team: These could include, but not be limited to, Civil/Mechanical/Electrical/ Structural (earthquake expertise) Engineers, Acoustical Engineers, Site/Landscape Planners, Vertical Transportation Consultant, Interiors/Graphics Designers, Materials Management Consultant, Medical Equipment Planner, Historic Preservation/Restoration Consultant, Parking/Traffic Consultant, Food Service Consultant, Waste Management Consultant, Information Technology Consultant (for space requirements), and Cost/Quantity Surveyor Consultant.

Note that some Public-Private Partnership Projects begin as a competition between Consortiums. After credentials are submitted in a pre-qualification phase, a number of Consortium groups are picked to actually provide detailed designs based on the TOR and submit a best offer or a not-to-exceed price for the package. This entails a tremendous amount of risk and work on the part of the Consortium (and also on the part of the Owner because the work of multiple Consortium teams must be monitored). Some of this risk is reimbursed by the Owner in the form of a fee paid to each Consortium.
It is our understanding that in this case the Consortium selection process will be directed by the Ministry of Public Works, which will issue invitations to a pre-qualified list from which only one Consortium will be selected to develop the final project.
THI provided the Ministry of Health planning team with copies of two United Kingdom National Health Service documents which could serve as a useful reference for proceeding with the selection process: 1) Mandatory PITN (Preliminary Invitation To Negotiate) Information Request, which includes a scoring Methodology for determining the various strengths and weaknesses of those submitting, and 2) The Design Development Protocol for PFI (Private Finance Initiative) Schemes, which describes in detail the information required to make up a complete design development package,

Action Area Two Details: The following is a list of health care planning and design considerations derived from current North American practice:

- Patient and Family-Centered Care: This concept is paramount in contemporary North American health care planning and design. The Minister of Health, Dr. Pedro Garcia, has outlined to our team his great interest in this aspect, and has endorsed the idea of good design as a contributor to a healing environment. Planners and designers should consider these aspects:

    - Patient privacy must be improved. Limit the number of beds per room to 4 or less. Each bed should have a zone for the patient's private use, i.e. a sitting area for a family member, a shelf for personal effects or displays, and a privacy curtain.

    - Provide a toilet and shower for each patient room.

    - Nursing stations should be transparent, accessible, and provide a design focal point for the unit, with artwork and plants as appropriate.

    - Nursing units and clinical diagnostic and treatment areas should have spaces for family to wait or to accompany patients near procedure rooms. Where appropriate accommodations should be provided for families to stay overnight, use telephones or the internet, have snacks and coffee, or grieve.

    - The interior design of highly technical spaces should emphasize an aesthetic, calming atmosphere. Photomurals, skylights, artwork and plants can be used. Views to the outdoors should be provided as appropriate.

    - Public facilities should be provided for patient, family and community programs to encourage healthy lifestyles. These can be designed as a part of a mall-like setting with commercial facilities that serve hospital employees as well as the public.

- **Inpatient Unit Organization and Design**. As more and more patients are being cared for on an outpatient basis, there is the perception that patients in North American hospitals are getting sicker. But, in reality, only the sickest patients are being cared for on the inpatient units. With the move to provide more outpatient care options, it would be expected that the Chilean facilities will soon experience the same phenomena. The following trends are relevant to planning for new inpatient units in this environment:

    - Aggregating patients by diagnosis as opposed to acuity. There was considerable discussion in our meetings of grouping all of the ICU patients for the two large facilities in one large ICU. This concept has been successful in small (i.e., 200-bed hospitals) in North America but has not worked in large, complex facilities for the following reasons:

- It is not realistic to expect ICU nurses to achieve and maintain competency in the wide variety of specialties of a tertiary care comprehensive ICU (i.e., neurosurgical, surgical. cardiothoracic, orthopedics, cardiology). In contrast, nurses can develop expertise in one or two areas (i.e., neurosurgical and trauma) and care for these patients frequently enough to maintain competency.
- Physicians prefer having their patients located in one area and it makes their job easier to have some sort of continuity between the intensive, intermediate and general care components of their patients care. If the units are located near of contiguous to one another, the staff provides some continuity. Otherwise, the physician must provide the continuity and communication between several remote, disparate units.
- As the definition between an intensive and intermediate care continues to blur, it is advantageous to the patient and nurse staffing to care for intensive and intermediate care patients on the same or adjacent units.

- <u>Decentralizing Services to the Point-of-Care</u>. As only the very acute patients remain in the hospital, it has become clear that they require more visual monitoring. In addition, shortages and high labor costs associated with technical personnel (e.g., registered nurses, respiratory therapists, physicians, etc.), it has become clear that we cannot afford to use these personnel to "hunt and gather" supplies, medications and information. With the advent of a computerized medical record, inpatient units should be planned with patient charting and supply storage adjacent to the point-of-care or bedside. It is recommended that a staff workstation be provided outside each pair of patient rooms with a counter-height writing surface, computer terminal, phone, cardiac monitor (if applicable), and supply storage for basic linen, supplies, and patient medications.
- <u>Family Involvement</u>. To move patients out of expensive inpatient hospital beds, it is imperative that the family become involved in patient care early so the necessary teaching can be completed and home care needs can be coordinated. This will result in the need for family space in the rooms and family consultation and teaching space on the unit.

- **Rehabilitation Units**. From discussions with a multidisciplinary group, rehabilitation care services are currently being delivered on the medical-surgical units but the services are poorly coordinated. As a result, complications such as aspiration pneumonia, atelectasis, and mobility issues occur. Also, of great concern was the fact that, although the patients remain in the hospital for a long period, they are not truly rehabilitated.

It was recommended that a dedicated rehabilitation unit be considered fro those patients who could return to their previous level or functioning or an increase in level of function with intensive rehabilitation services. A rehabilitation unit typically consists of a series of inpatient beds and a dedicated area for physical, occupational and speech therapy. It also includes a dining room where patients are served meals. Patients usually participate in two to three hours of therapy over a two or three week period.

Patients are transferred to the rehabilitation unit when they are medically stable and cared for by a physiatrist. The majority of patients on these units are neurologically compromised (e.g., stroke, head injury, etc.) or have orthopedic issues (e.g., joint replacement, trauma).

It should be noted that a trial rehabilitation unit could be set up in one of the vacant units in the hospital prior to the completion of the hospital project. This would provide an opportunity to evaluate the results of the unit and try new concepts.

- **Ambulatory Care/Day Hospital.** In discussion of an anticipated shift to more ambulatory care, several important issues were raised:

    - Shared exam room space. Due to the cost of new facilities, it will be important that the physician exam and consult room space be fully utilized. As shown in the Figure 5, the exam rooms are organized into modules that can be shared by different specialties as needed. Treatment areas and office space at the back of the module can be easily shared between several disciplines.

    - Day Hospital Space. Three examples of day hospital space were presented and discussed. These included ED observation space, same day surgery/short-stay, medical procedures space, and an infusion center. It was emphasized that the goal of day hospital space should be to provide convenience to the patient, group patients with similar clinical needs and to group services such that operational efficiencies from sharing staff and equipment can be realized. Examples are included in the appendices.

    - Creating Institutes. It was interesting that there was significant discussion about the role of the Thorax and Neurosurgical Institutes. It was stated that it was very important to maintain their identity but some were concerned about the operational inefficiencies that resulted from so much duplication of support service.

In North America, many hospital are adopting the "institute concept" to market a service, develop staff expertise, and to create staff pride. However, in the North American model, institutes are created with only the patient care areas, either inpatient or outpatient. And, all of the major, expensive diagnostic/treatment services (e.g., operating rooms, imaging services, etc.) and/or support services (i.e., dietary, materials management, etc.) are centralized.

- Functional Planning: North American health care facilities have become more complicated and now include so many different elements that it is important to develop very clear circulation patterns and functional relationships to make them more efficient and user-friendly. This will certainly be a factor in the redevelopment of the Salvador Infante site. Planners and designers should consider these aspects:

    - If there is enough site area, consideration should be given to the creation of separate structures to contain the separate functional areas with very different climate and structural needs. For example, a separate structures concept could include:

      1) A low-rise industrial-type building with large structural modules to house materials management, central plant, maintenance and other similar functions.
      2) A high-rise building with a structural module in smaller increments to house inpatient bed units and administrative areas.(As an alternative to a single high tower with inpatient units arranged in linear form, a series of lower towers with smaller footprints, containing nursing units of perhaps 25-30 beds, interconnected on each floor, in more compact square or triangular shapes could be considered.)
      3) A two or three story building with structural modules of, say, 10x10 meters, to house higher-tech treatment and diagnostic functions.
      4) An ambulatory care building designed on a modular principle so that a consistent, repetitive floor plan of clinic modules can be accommodated for flexible scheduling and interchangeable use.

    - A more horizontal development of the site, as suggested above, could require long horizontal runs for the delivery of supplies to various clinical areas. An electric tug system could be considered to provide horizontal transportation of carts to selected vertical lift points serving upper floors.

    - The separation of service/inpatient/in-house traffic from public/outpatient/visitor traffic will be essential both in the horizontal circulation and vertical circulation.

- Public circulation areas can be clearly defined and organized by providing focal points of reference. Corridor intersections can be memorable, designed "places", not just "spaces". Views to the outside horizontally or views vertically in multi-level atriums can help orient pedestrians.

- Planning should take into account future change. Structural modules should be chosen that would not compromise future reuse or technological requirements. As much as possible, those high-tech departments, like imaging, which are most likely to change and expand, should be located on the perimeter of the building block. In the Salvador Infante complex, for example, surgery should be located so that a future consolidation of Neurosurgical and Cardio/Thoracic workloads can be integrated with the main block by simply expanding it. Where a department cannot expand into new construction it is always a good idea to locate "soft spaces" next to "hard spaces", so that the soft spaces can be vacated for the expansion of the hard ones.

- The mechanical/electrical engineering concepts should be considered early in the programming and planning effort. The location of the central plant and the major equipment rooms will affect the routing of steam and chilled water lines, which could affect other functional relationships. Information technology/communications spaces also need early consideration. North American hospitals are now providing a room of about 9 to10 square meters for every 3000 or so square meters of floor plan for IT panels and devices.

- Epidemiological Considerations: These can be integrated into the functional planning. North American hospitals are more and more going to all single rooms, making the assignment of patients by sex or diagnosis easier. Single rooms can potentially be isolation rooms. Since all single rooms are probably not financially feasible for public hospitals in Chile, care should be taken to provide as many epidemiological safeguards as possible. Each 30 beds should have at least one designated single/isolation room. Hand-washing sinks should be liberally provided in corridors, at nursing stations, and in patient rooms in addition to the sinks in the toilet and shower areas. In large waiting rooms, the current North American practice is to subdivide the space into smaller groups by semi-partitions with separate ventilation for each area to limit cross-contamination.

We should note that there are good examples of some of the above considerations already existing in the Luis Tisne Public Hospital in Santiago, which was planned by Chilean architects, and in the Clinica Las Condes Private Hospital in Las Condes, which was planned by a North American consultant.

Action Area 3 Details:

This analysis is based on a site visit to the GG Benavente and trauma hospital campuses as well as a review of the schematic design drawings dated March 2005. The project is scheduled for bidding in April of 2005 with a preliminary construction start date of September 2005. Given it is so late in the process; this review focuses on overall issues, minor changes that could easily be made and would improve the functioning of the facilities and recommendations for future phases.

These recommendations were reviewed with Mr. Johnny Villouta on April 28th , 2005. Since the initial visit, a structural analysis had been completed and some minor changes were made to the plans. The suggestions were well received and will be evaluated to determine if they can be incorporated into the plans at this point in time.
The project consists of two major components on the campus of the GG Benavente Hospital:

- Replacement of the ambulatory care clinics currently located in the basement of the oldest campus building, the Monoblock building.
- Replacement of the trauma/orthopedic hospital located across the street.

Several options were evaluated for the replacement of the trauma hospital (replace on the current site, a new site or building on site shared with other facilities). Although the proposed solution, locating it on the site of the GG Benavente Hospital, will result in a very congested site, this solution will allow for sharing of all the support services (i.e., CS, dietary, maintenance, etc.). However, in order to fit on the site, the floor plate of the hospital is long and linear.

The GG Benavente site currently consists of two major components:

- The newer Tower building which houses several key services, the emergency department, surgery suite and intensive care unit.
- The older Monoblock building which houses inpatient units on the upper levels and the ambulatory care clinics in the basement. It is connected to the Tower building on several levels.

The following text summarizes the two major components of the proposed project:

- Ambulatory Care Center: The ambulatory care center is proposed for the corner of San Martin Street and Janequeo Street in Concepcion. It has two sections, the six story ambulatory care clinic building and the four story "connector" building that will attach the ambulatory care clinic building to the trauma hospital. The first floor of the building is slightly above grade so the main entrance is accessed via stairs or a ramp. There is an atrium space in the entrance with four wings of clinical services radiating from it.

The building footprint includes four wings of clinical services on the basement through third level. On the fourth and fifth levels, the footprint is reduced to three wings. On the sixth floor, there is only one wing. The wings are connected at a midpoint through the third floor. The fourth through sixth levels are not interconnected at the midpoint.

The southern corner of the building has a sunken driveway that provides a drop-off area on the basement level for patients transferred to this facility by ambulance.

The following services are located on each floor:

- The lower level includes rehabilitation services (PT, OT, and pulmonary) for both adults and children. The connector building has an orthopedic rehabilitation area.

- The first floor and entry level has a large registration area, women's services, sexually transmitted disease clinic (with separate entrance) and oncology (adult and pediatric). The connector building houses the pharmacy and an auditorium.

- The second floor has a public cafeteria with a three-story atrium above it and clinical spaces for rheumatology, endoscopy, adult medicine, cardiology, and dermatology. An ambulatory surgery suite with six operating rooms is located in the connector building.

- The majority of the third floor is utilized for laboratory space and one wing is used for dental and maxillofacial clinical services. The connector building houses mechanical equipment on this level and is not interconnected to the ambulatory care building.

- The four floor houses neurology, ophthalmology, pulmonary and ENT clinic services.

- A series of pediatric services are proposed for the fifth floor.

- An administrative suite is included in the one wing of the sixth floor.

- Trauma Hospital: The trauma hospital is a long, linear building with a basement and five levels above it. On the lower level, there is a parking area beneath a portion of the building. On the first level, there is a driveway that passes through the building that will provide access to the ED. In the future, this driveway will provide below-grade and at-grade access to the ED. In Phase II, there are plans to put the ambulance entrance and trauma rooms on the basement level of the tower building. This location will provide a direct connection to the trauma hospital.

At the northeast edge of the building, there is a stair tower and series of ramps that provide emergency egress from the building. There is one section of the building in which three and a half bays will be shelled-in for future expansion space.

Similar to the ambulatory care building, there is a light well providing daylight to the basement of the facility along San Martin Street.

The trauma hospital is connected to the GG Benavente hospital on the basement and second level. It is connected to the ambulatory care building on the basement through second levels.

The components of the building are organized as follows:

- This level includes an orthopedic clinic adjacent to the orthopedic physical therapy area in the connector building. This level also includes the staff locker rooms and waste management area.

- The main entrance off of San Martin Street, the public lobby, and the administrative suite are located on this level. In addition, there is a covered exterior plaza that provides access to a small, internal outdoor plaza. The auditorium in the connector building can be accessed from this covered plaza.

- The surgery suite (6 ORs and one procedure room) and an 8-bed ICU are located on the second floor adjacent to ambulatory surgery suite in the connector building.

- The third floor is primarily mechanical floor but does include an inpatient radiographic room and a public cafeteria/snack bar. There is a proposed future connector to the tower building on this level.

- The fourth and fifth floors are inpatient floors. The fourth floor has a 44-bed unit (11 4-bed rooms) and a 17-bed unit (4 4-bed units and one private room). There are a total of 61 beds on this floor.

- The fifth floor has a 44-bed unit (11 4-bed rooms) and an 11-bed unit (3 private, 4 semiprivate rooms).

COMMENTS AND RECOMMENDATIONS ON THE PROJECT:

Site Development Issues and Opportunities: This hospital complex is located on a congested, urban site. The proposed projects include a site plan which organizes access and parking on the site. In particular, it reduces the amount of public traffic through the site. It has the added benefit of developing a series of public green spaces to soften the site and provide pleasant outdoor areas for patients and their families.

Parking: The adequacy of the proposed parking has been raised as an issue. There are currently 305 spaces on the campus that are not well organized or managed. It is reported that 70 of the spaces are used by persons that do not work at the hospital and approximately 15 are used by students. The proposed plan will provide 310 spaces in the first phase. The spaces will be well organized and managed through the use of gates as appropriate. In the second phase, some underground parking will be provided and will bring the total number of spaces available to 550.

Issues/Opportunities

- The short-term parking needs have been addressed. It may be prudent to compare underground parking with off-site or adjacent parking sites for long-term planning purposes.

Master Plan: The proposed projects are part of an overall master plan (Figure 1). The architects have developed a master plan that shows several subsequent phases of development:

- Phase II: After ambulatory care area, the ED is the area most in need of improvement. The master plan proposes relocating the trauma component of the ED to the basement level of the tower building into the area that will be vacated by rehabilitation services. This will require a below-grade drive to access this area and a separate at-grade drive to access the existing ED. An adjacent one-level parking deck is proposed.

- Phase III: In Phase III, a new 8-story building has been identified to be located in a courtyard of the Monoblock building with a helipad on top of it. A small building that will become vacated with the opening of the ambulatory care building will need to be demolished in this courtyard.

Issues/Opportunities

- Future Inpatient Tower: The proposed location for the 8-story tower is excellent for a future inpatient building to replace many of the Monoblock units. Initially, a building on this site can be connected to the proposed ambulatory care building and the trauma hospital. Then, a portion of the Monoblock building could be demolished or renovated to provide a connector to the tower building housing the ED and surgery. After it is constructed, the demolition of all or a portion of the remaining Monoblock building can be evaluated.

Wayfinding: The new building and existing buildings will be well integrated. Perhaps the key component of the proposed design that facilitates way finding is the two separate circulation systems, one for the outpatients and public and one for inpatients, staff, and services.

Issues/Opportunities

- Public Circulation: As previously mentioned, the separate public circulation works well within the facility except on the second floor. On this floor, the public corridor dead-ends at the ambulatory surgery reception desk. Although not a fire egress issue in Chile , this eliminates the connection to the public elevators of the trauma hospital. This can be changed by relocating the ICU, which is discussed later.

- Patient/Service/Staff Circulation. The trauma hospital is already a very narrow building. The internal location of the stair towers and elevator banks makes the circulation more cumbersome as in several locations the corridor must pass around the stair tower. In contrast, the stair and elevator towers in the ambulatory care building are on the exterior edge of the building, which simplifies the circulation route. This change could be evaluated and be made if the benefits, primarily on the basement and second floor, could justify it.

Building Design Infrastructure: The trauma hospital building is designed on a 10 M by 10 M bay system which is close to a 30 ft bay found to be most flexible in US design. This size is large enough to accommodate high-tech spaces such as ORs and radiographic rooms without columns encroaching on the space and it does not result in beams of excessive depth.

The ambulatory care building is planned to be energy efficient and responds to the unique climate of Concepcion. The proposed building has an unusual shape with an entry area and four narrow wings will allow each room to have natural ventilation and lighting. This shape will allow mechanical ventilation by pulling air through the building via operable windows. No mechanical cooling will be provided. In addition, each room in the facility has access to daylight. This includes the basement level in which sloped light wells along the perimeter and interior light wells provide day lighting.

There is an elevator bank in each of the three building sections; ambulatory care, the connector and the trauma building. There is only a single service elevator in the ambulatory care building but it can easily be supplemented by the elevator bank with two cars in the connector building.

There will be a pneumatic tube for the transport of laboratory specimens and small materials. Laboratory results will be reported by computer.

The center section of the building which connects the ambulatory care building to the trauma hospital has the capacity to expand vertically two additional floors.

Issues/Opportunities

- Response to environment: The proposed buildings are excellent examples of integrating the facility with the natural environment and energy-efficient planning. There is an additional initial cost associated with the narrow wings on the ambulatory care building. However, this should be offset by the long-term energy savings.

Functional Relationships: The following comments relate to the how the functional areas are organized within the building:

Ambulatory Care Center: As previously mentioned, this building is organized into four wings radiating from a central entry area. On some of the floors, the wings have an intermediate connector corridor that connects the wings at the midpoint. These connectors are not consistent throughout the building and do not exist on the fourth and fifth levels. The fourth floor houses three unrelated specialty clinics and the fifth floor houses a series of pediatric clinics. Each wing is approximately 30 M or 100 feet long. So, without the intermediate connector, it will be difficult to integrate activities, communicate and share resources between the wings. It was reported that some of the intermediate connectors were removed due to cost concerns.

Issues/Opportunities

- Intermediate Connecting Corridors. For future flexibility, it is recommended that the intermediate corridors be provided consistently throughout the building. It will involve a minor amount of reconfiguration to achieve this but it will ensure that the building can serve several different types of clinical services in the future.

Trauma Hospital: There is one area within this building where the arrangement of spaces is less than optimal and that is the second floor.

- Surgery Suites. There are three surgery suites on the second floor; the existing suite in the tower building, the new orthopedic suite, and the ambulatory care suite in the connector building. None of these suites are connected in such a way that there can be any sharing of staff, space, equipment or other resources.

  The existing suite is connected via a new connector. However, the connector links a sterile area within the existing surgery suite to a public corridor so people can leave the Benavente surgery suite but they cannot go from the public corridor of the trauma hospital into the Benavente hospital.

In addition, the new orthopedic suite and ambulatory surgery suite are not connected because they are separated by the ICU. Therefore, surgeons, staff and equipment cannot go between the areas without going out into the service corridor.

- ICU. There is an 8-bed ICU located between the trauma surgery suite and the ambulatory surgery suite. Open cubicles are provided and only four of the cubicles have windows to the outside. Minimal support space is provided for the unit.

Issues/Opportunities

- ICU. Although it is late in the process, consideration should be given to relocating the ICU proximate to other inpatient beds. A small, eight bed unit is inefficient to staff. In addition, there is no consideration given to providing intermediate care or step-down beds as part of the continuum of care. It would be more efficient to locate the ICU in shelled space on the west end of the fourth or fifth floors where the adjacent beds could be used for intermediate care.

- Surgery Suite. By relocating the ICU, the trauma and ambulatory surgery suites can be connected and several space concerns can be addressed. First, only a total of 13 holding and recovery bays are provided for 5 ambulatory operating rooms. A minimum of 3 bays per OR should be provided if they are in the same area and can be used interchangeably. Only minimal waiting along the corridor is provided for the trauma ORs. This is an area where patients have many family members wait. It may be prudent to consider expanding this area. However, since the cafeteria is directly above this area, families could be directed to that area.

Space Allocation: At the time of this analysis, the functional and space program was not reviewed. The buildings are clearly designed for significant future growth.

Issues/Opportunities

- Capacity Analysis. The building represents a significant increase in the amount of space currently used for these functions. It may be helpful to develop a capacity analysis to document the additional volume that this facility could accommodate to assist with regional planning.

Inpatient Units: The inpatient units are designed with primarily four bed wards that can accommodate the expansion to five beds in the future if necessary. Each room includes a toilet and shower room. There is a nurse work area and hand-washing sink within each room. Each patient has a bed, bedside table, and closet.

Issues/Opportunities

- Nurse Workstation. Consideration should be given to relocating the nurse workstation in the same location but on the outside of room (Figure 2). This workstation is where a computer and phone should be provided. In addition, observation windows should be provided into the two adjacent rooms.

- Patient Toilet/Shower Room. A toilet/shower room design frequently used in the US has a slightly recessed floor of the shower, which allows a larger portion of the room to be used for showering (Figure 3). When the shower is not in use, space from the shower can be "borrowed" for using the toilet or sink. This is especially helpful for patients who use walkers or wheelchairs.

Cost Model: A detailed cost model was not shared with us during our visit. However, several issues were raised regarding the cost of the project, what was included, how equipment was addressed, etc.

In the initial documents provided to us, the construction cost was estimated at $20.2 M and the equipment costs were estimated at $3.67 M.

In order to truly evaluate and understand costs, a cost model needs to be developed and refined as information and estimates are refined. A typical cost model is provided as Figure 4.

Issues/Opportunities

It is very clear that the proposed facilities are desperately needed. If the initial estimates exceed the budget, the following alternatives may be considered to reduce costs:

Trauma Hospital

- Eliminate the under-building parking and sloped access drive. There is a significant cost every time a vehicle gets close, goes under, goes through or goes over a building of occupied area.
- Eliminate the access drive through the building. Evaluate whether by building out the shelled space and the building can be shortened and the drive through eliminated.
- Consider eliminating or reducing the covered plaza.

Ambulatory Care Center

- Standardize the footprint of the building and reduce it to five floors.
- Consider reducing the height of the atrium or eliminating it.
- Eliminate the under building drop-off at the basement level.

- Evaluate whether the laboratory could be more efficiently designed in a floor of the connector building thereby reducing one floor of the ambulatory care building.

It should be noted that none of these recommendations are ideal but they may assist in saving the project if the initial bids are too high.

CONCLUSION

The following salient points have been extracted from the above discussions of the Architectural Component:

1. Option Three is recommended for further development.
2. Further analysis and fine-tuning of the amount of space that requires air-conditioning is recommended.
3. A location for the central plant areas within the main hospital building with a stack through to the roof , and with cooling towers on the roof, is recommended.
4. All mechanical/electrical spaces, including communications and electric closets should be programmed as net functional areas.
5. Electrical and communications distribution for open areas like offices and laboratories should be in the ceiling space.
6. A Functional Program should be written for each functional entity and included in the TOR as guidance for the Consortium planners.
7. Patient Rooms should have no more that two beds on each wall.
8. Each two patient rooms should share a nursing substation on the corridor .
9. Plan the Salvador Infante replacement hospital so that the two Institutes can be "plugged in" to the complex in a future phase, in a configuration which preserves their identities.
10. Retain ambulatory consulting clinics in the two Institutes by reusing vacated spaces in the Institutes to house them in the first phase, rather than combine them with other more remote clinics in new construction.
11. Include an option in the TOR to renovate areas in the two Institutes as needed.
12. Consider a less expensive parking structure, mostly above-ground, on part of the Geriatric Institute site to complement parking planned under the replacement hospital.
13. Continue to update the project budget on a regular basis through the programming and planning stages up to the time the TOR is issued.
14. Decide what minimum deviation from the Architectural Program will be allowed as the Consortium planners develop the project.
15. Decide whether the Consortium planners will be requested to "review and confirm" the Architectural Program as a part of their services.
16. Develop a clear strategy for the removal, and temporary relocation as necessary, of the existing functions in Zone 2 where the Option Three scheme will be built.
17. Consider in the interests of human scale, that instead of one large linear tower block of beds, the tower be divided into compact rectangular, square, or triangular units of

25-30 beds each in interconnected mini-towers with rooftop courtyards between them.

18. Respect as much as possible the existing Park-like area in Zone 2, which could be used as a backdrop to public and visitor areas.

The GG Benavente ambulatory care center and trauma hospital projects appear to be well thought out projects. Even though this analysis was completed so late in the planning, major changes would not have been recommended even if it had been completed very early in the planning. It is hoped that the minor recommendations will be considered and a cost-benefit analysis completed. The greatest concern with this project has been the cost. In the future, it may be helpful to engage in an on-going cost estimating process to better gauge where the project is during each phase of development. It is hoped that these two projects that are desperately needed will move forward in the development process.

E. Medical Equipment Component:

INTRODUCTION:

During the two site visits to Chile, issues regarding medical equipment technology were examined and evaluated through the following venues:

- Meetings with representatives from the Ministry of Health and the SSMO (Eastern Health District).
- Review of documentation related to Health Care Reform (AUGE) goals.
- Meetings with clinical and administrative staff at the Salvadore Infante (SI) complex in Santiago.
- Tours and inspections of existing medical technology at the various SI facilities, including the original hospital and the four specialty hospitals for thoracic, neuro, geriatrics, and infants.
- Meetings with clinical and administrative staff at Benavente Hospital in Concepcion.
- Tours of clinical areas and inspection of existing medical technology at Benavente Hospital.
- Review of project-related equipment planning documents that have been developed to date.

This section will address the findings of these efforts, and will provide specific recommendations for the acquisition and management of medical technology. The use of medical technology to further the goals of AUGE, to implement operational improvements, and to enhance the competitive position of public health care facilities in general, will also be addressed.

ONSITE MEETINGS AND OBSERVATIONS:

1. The government of Chile, already having substantial foreign investment, would like to attract further investment through a Public Private Partnership (PPP) arrangement with the appropriate parties.
2. Health care coverage is through private insurance for 31% of the population (generally the most affluent), and through the public insurance system FONASA for the remaining 69%.
3. About 63% of the population is 15-64 years old, with 12% over 64. The SSMO (Eastern Health Service) district is aging faster than other districts.
4. The leading causes of death for people over 64 are cardiovascular disease and cancer.
5. Public facilities (i.e., the Salvador Infante Complex) serve about 45% of the population in the SSMO, with the remainder served by private facilities.
6. Public facilities are more willing and able to handle complex cases.
7. Private facilities tend to have nicer amenities, but tend to avoid complex cases.

AUGE is a mandatory national quality of care improvement program that identifies 25 patient pathways where wait times and quality of care are critical to preventing further complications. The Ministry places a very high priority on compliance with AUGE standards.

Ministry of Health

RECOMMENDED STRATEGIC INITIATIVES:

Strategic Initiative #1:

Respond to Healthcare Reform requirements.

Action Steps:

1. Identify operational bottlenecks where patient throughput is hindered by technological shortcomings. Technologies and devices which specifically address the goals of AUGE are identified in Attachment E.1. Detailed descriptions of these technologies, as well as design and engineering considerations, are provided in Attachment E.2.
2. Invest in technologies which reduce wait times and increase throughput, to include not only diagnostic and treatment technologies but also support services such as sterile processing. Specific areas to consider include: increased utilization of faster CT (computed tomography) and computer-assisted diagnosis of imaging studies; use of telemedicine to facilitate long-distance consultation and diagnosis; use of faster and safer low-temperature sterilization methods to speed up OR turnaround; and expansion of advanced surgical suites specialized for minimally-invasive and interventional procedures.

Strategic Initiative #2:

Improve public perception of public healthcare facilities.

Action Steps:

1. Promote the presence and use of advanced technology at public facilities as a means of attracting and retaining patients, particularly those with private insurance.
2. Emphasize the handling of complex cases by public facilities to portray them as institutions with the most competent staff and advanced techniques, able to deal with any medical situation.

Strategic Initiative #3:

Encourage standardization of information technology (IT) among public facilities.

Action Steps:

1. Standardize systems and protocols for the Electronic Patient Record.
2. Determine standard protocols for communication between medical devices, and for communication of medical devices with the hospital network.

Strategic Initiative #4:

Establish and promote Technology Management at public facilities.

Action Steps:

1. Establish the position of Technology Manager at the Ministry of Health.
2. Utilize this position to define and communicate standard procedures among public facilities for evaluating existing technology, as well as standards for evaluation and adoption of new technologies.

See Attachment E.3 which provides an objective, standardized methodology for scoring/evaluating existing assets.

Salvador Infante Complex:

ONSITE MEETINGS AND OBSERVATIONS:

The Salvador Infante (SI) complex is very highly regarded as a pioneering medical facility and center of learning in Chile's public healthcare system.

1. The majority of medical professions are trained at SI.
2. In addition to the original SI hospital, the campus also includes four specialty hospitals for thoracic, neuro, geriatrics, and infants.
3. SI is always at the forefront of medical complexity, with 55% of patients classified as medium or high complexity.
4. SI hospital provides all medical specialties, except neuro and cardiovascular which are provided in the on-campus specialty hospitals.
5. SI Hospital is currently renovating and upgrading its ICU; the thoracic institute also began a remodeling program in 2004.
6. Major clinical areas were toured and clinical equipment observed. There was a broad mix of equipment manufacturers and models in most areas.
7. Equipment maintenance is performed primarily by the equipment manufacturers and dealers. There is no biomedical engineering department.
8. Equipment maintenance, or the lack thereof, appears to be a significant issue.
9. Support and maintenance are of particular concern for the more sophisticated imaging and monitoring systems utilized in the thoracic and neurologic institutes.
10. Computed radiography (CR) and digital image management are not present at SI Hospital, but are utilized to varying degrees at the thoracic and neurologic institutes.

11. The thoracic institute provides 65% of the cardiothoracic surgery in the nation.
12. Strong interest in telemedicine and ECG management was expressed at the thoracic institute.
13. The neurologic institute is currently expanding its Surgery and Critical care areas. Presently there are four ORs.
14. The new ORs are being sized to accommodate robotics and image guidance.
15. There is a strong interventional practice at the neurologic institute.
16. The neurologic institute recently purchased a Philips 1.5T MRI, which is the first MRI acquired by the public sector in Chile.
17. At the neurologic institute, the Fuji PACS/RIS system manages digital images from ultrasound, MRI, CT, angiography, as well as radiographic images digitized by CR (plate readers).
18. The geriatric institute has 85 beds and provides geriatric care as well as physical and rehabilitative medicine.
19. The geriatric institute provides in-house diagnosis and treatment, but imaging and some procedures are done at the other specialty hospitals.

RECOMMENDED STRATEGIC INITIATIVES:

Strategic Initiative #1:

Reduce equipment service costs and increase equipment uptime.

Action Steps:

1. Develop an on-site clinical engineering program in concert with the concessionaire, for the purpose of managing, maintaining, and repairing clinical equipment in a timely and cost-effective manner.
2. Communicate and interface with the Technology Management position recommended for the Ministry of Health, for the purpose of sharing information and evaluating the suitability of new technologies.
3. Learn from the similar program established at Luis Tisne.
4. See Attachment E.4 for a sample scope of work for third-party Technology Management services.

Strategic Initiative #2:

Reduce duplication of technical and support services between the main hospital and the two specialty institutes (neuro and thoracic).

Action Steps:

1. Consider establishment of a central dispatch/service center for shared medical equipment, to be operated by the concessionaire.

2. Consider centralization of patient monitoring operations, with combined servers linking hardwired and telemetry monitoring from all campus facilities..
3. Consider consolidation of sterile processing functions (more on this topic below).

Strategic Initiative #3:

Continue to promote and support medical education and post-graduate studies.

Action Steps:

1. In the process of selecting a concessionaire, include the need for this party to create a "center of excellence" for medical training, both on-site and through telemedicine.
2. Continue to elevate the level of medical technology through adoption of appropriate new devices and techniques.
3. Provide opportunities for equipment manufacturers to showcase their "latest and greatest" products. In the US, vendors often leap at the opportunity to install their products in prestigious teaching facilities, usually under very favorable terms. The thinking (right or wrong) is that a physician trained with equipment from a particular manufacturer will continue to prefer that brand after he/she completes their education.

Strategic Initiative #4:

Develop strategies to maintain or gain market share from private services.

Action Steps:

1. Encourage the concessionaire to create a service center which will complement (exploit weaknesses in) surrounding private services.

2. Promote the hospital's sophisticated technology (such as imaging in the neurologic institute) which many private centers may not be able to afford.

3. Utilize the hospital's economies of scale (as with centralized sterile processing, if established) to provide private centers with needed services at a lower cost than they can obtain elsewhere. Seek ways to make the private centers dependent on the hospital.

Strategic Initiative #5:

Utilize technology to best advantage in implementing the new patient care model.

Action Steps:

1. A major component of the new patient care model is to vary the level of care for a patient in accordance with changes in the patient's acuity. Consistent severity scoring of the patients' condition will be key to the successful implementation of this effort. Patient monitoring systems can be used to automate severity scoring, thereby providing consistency of scoring and reduction of nursing effort required.

2. Centralize patient monitoring to further enhance the value and effectiveness of automated severity scoring, since all scoring could similarly be centralized.
3. Increase the use of telemetry monitoring for acuity-adaptable settings.

Strategic Initiative #6:

Improve processing of rigid endoscopes and other heat-sensitive items.

Action Steps:

1. Consider adoption of Steris System One processors for sterilization of rigid scopes. This technology is used in the vast majority of US hospitals, enabling rigid scopes to be processed between cases within the OR suite. With a cycle time of about half an hour, this methodology is much faster and safer than manual soaking or EtO sterilization. Minimally-invasive surgical procedures continue to grow in volume, and rigid scopes are almost always used.
2. Consider adoption of STERRAD Plasma sterilizers from Advanced Sterilization Products (a division of Johnson & Johnson), for other low-temperature sterilization needs. This device has no harmful emissions, can be easily relocated, and requires no utilities except electrical. Cycle time is less than one hour. In contrast, EtO processing often requires eight or more hours for sterilization and aeration of certain items. EtO also requires extensive utility connections, is harmful to the atmosphere, and is very toxic to humans (though current devices limit the risk of operator exposure).
3. Use the above-mentioned technologies to work toward the goal of eliminating EtO sterilization. In addition to the potential hazards mentioned above, EtO processing also requires the hospital to maintain larger inventories of expensive instruments, due to the relatively long cycle time that EtO requires.

Strategic Initiative #7:

Provide adequate space to support IT closets and other storage needs.

Action Steps:

1. Create a central location for servers and other network gear which supports medical networks as well as information systems hardware. Allow for significant heat load.
2. Allow sufficient alcove and other storage space for medical devices, to avoid hallway clutter in areas such as Surgery, Critical Care, Med/Surg, and Nursery.

Benavente Hospital, Concepcion:

ONSITE MEETINGS AND OBSERVATIONS:

1. Imaging department is in the oldest part of the complex. Imaging equipment is generally more outdated than in the Santiago facilities.
2. Hospital provides radiation therapy with a Varian linear accelerator.
3. Lack of space is a universal problem here, made worse by the high level of patient acuity. ORs are particularly small.
4. Flexible endoscopes are processed manually in the GI department.
5. EtO is utilized in Central Processing for low-temperature sterilization.
6. There is a lack of equipment standardization in most departments.

B. Recommended Strategic Initiatives

Strategic Initiative #1:

Upgrade outpatient diagnostic technology.

Action Steps:

1. Consider acquisition of a faster CT, and perhaps a dedicated chest room, to increase outpatient throughput.
2. Consider using one of the older CTs for Rad Therapy simulation.
3. Consider adoption of CR, to enable digitization of radiographic images and enable full participation in the recommended telemedicine initiatives.

Strategic Initiative #2:

Improve the Trauma/Orthopedic ORs.

Action Steps:

1. Size ORs similarly to the new ORs being planned in Santiago, in order to allow space for robotics, intra-operative imaging, etc. Minimum recommended size would be at least 650 square feet (60.5 square meters).
2. Incorporate ceiling booms to facilitate minimally-invasive surgical procedures.
3. Ensure that the air-handling system provides appropriate airflow to the surgical field. Lack of proper airflow is believed to be a major cause of infection in orthopedic cases.

Strategic Initiative #3:

Interface medical equipment with hospital information systems (HIS).

Action Steps:

1. Adopt a requirement for standard interface (e.g., Medical Information Bus, or MIB) with HIS in procuring relevant equipment.
2. Also require equipment vendors to certify seismic tolerances of equipment.

Strategic Initiative #4:

Provide adequate space to support IT closets and other storage needs.

Action Steps:

1. Create a central location for servers and other network gear which supports medical networks as well as information systems hardware. Allow for significant heat load.
2. Allow sufficient alcove and other storage space for medical devices, to avoid hallway clutter.

Strategic Initiative #5:

Upgrade Central Processing operations to accommodate the new trauma hospital.

Action Steps:

1. Eliminate handwashing of instruments. Have equipment vendor resolve problem with installation of new washers, and get them operational ASAP.
2. Implement closed case cart system to bring sterile instruments to the ORs and dirty instruments back to Central Processing.
3. Adopt the use of flexible endoscope processors (such as the Olympus DSD) for GI which utilize Cidex or a similar high-level disinfectant. Like System One Processors, units like the Olympus DSD are much faster, more effective, and safer for the staff than hand processing. Note: The Steris System One Processor can be used to process flexible GI scopes as well as rigid scopes. However, this practice is discouraged by the leading manufacturer of flexible scopes (Olympus), and there have been numerous reports of damage to flexible scopes by System One Processors.
4. Endeavor to reduce or eliminate the use of EtO through expanded use of other low-temperature sterilization methods.
5. Rigid endoscopes can be processed much more quickly, safely, and efficiently with Steris System One Processors than with handwashing. These devices are typically used in the OR suite, rather than in Central Processing. A typical ratio is one Steris System One Processor for every two or three ORs.

Public Private Partnership:

RECOMMENENDED STRATEGIC INITIATIVES:

Strategic Initiative #1:

Maintain control over the level of technology available in the facility.

Action Steps:

1. PPP administrators to determine the degree of freedom the concessionaire will be granted in this area.
2. Create technology review committee with physician, nursing, and administrative participation to review concessionaire's plans for technology implementation.
3. Establish criteria for Technology Management services to be provided at Salvador Infante (see Attachment E.4for example of criteria).

Strategic Initiative #2:

Create a framework for research and development partnerships with the concessionaire.

Action Steps:

1. Ensure that selected concessionaire for the PPP has substantive credentials in the medical technology industry, or is partnered with a major medical technology manufacturer/vendor.

Strategic Initiative #3:

Realize the full market value of existing medical technology assets.

Action Steps:

1. Conduct an inventory and establish the current market value of existing assets.
2. Require, as part of the concessionaire agreement, that the concessionaire purchase the assets at market value upon execution of the contract.
3. Consider salvage of metals, and recycle obsolete computers.
4. Consider opportunities for re-deployment of assets in other Ministry facilities.

CONCLUSION:

The projects presently underway in Santiago and Concepcion offer meaningful opportunities to accelerate the initiatives of Health Care Reform. Priority must be given to adopting, expanding, and upgrading medical technologies that are specifically targeted to alleviate weaknesses and bottlenecks in the current system. However, the funds required to properly equip the project-related areas at the SI complex are expected to exceed the budget by at least 35 percent. To successfully finance the project, a creative approach to the PPP relationship is recommended, with careful attention to the selection of the concessionaire. For example, by requiring the concessionaire to take ownership of (purchase) all existing medical technology assets, the SI complex should gain access to additional funds in the amount of at least US$25 million. The requirements for up-front capital can be further reduced by utilizing selected medical technologies on a fee-for-use basis, rather than through outright purchase.

The projects also present opportunities for operational improvements related to medical technology in both Santiago and Concepcion. Examples include consolidation of sterile processing operations at SI to reduce duplication and increase consistency, and the implementation of a surgical case cart system to improve infection control and instrument processing at Benavente Hospital.

Finally, there should be full advantage taken of the public relations opportunities offered by the project. Advertising campaigns are recommended to enhance awareness of the commitment by public health care facilities to state-of-the-art medical technology. Public facilities are already known for taking the most complex cases; this perception should be reinforced and enhanced by project-related capital investments. Public facilities should be rightfully perceived as medical centers of excellence, providing the finest available care with the latest in medical technology.

FIGURE 1 – Master Plan

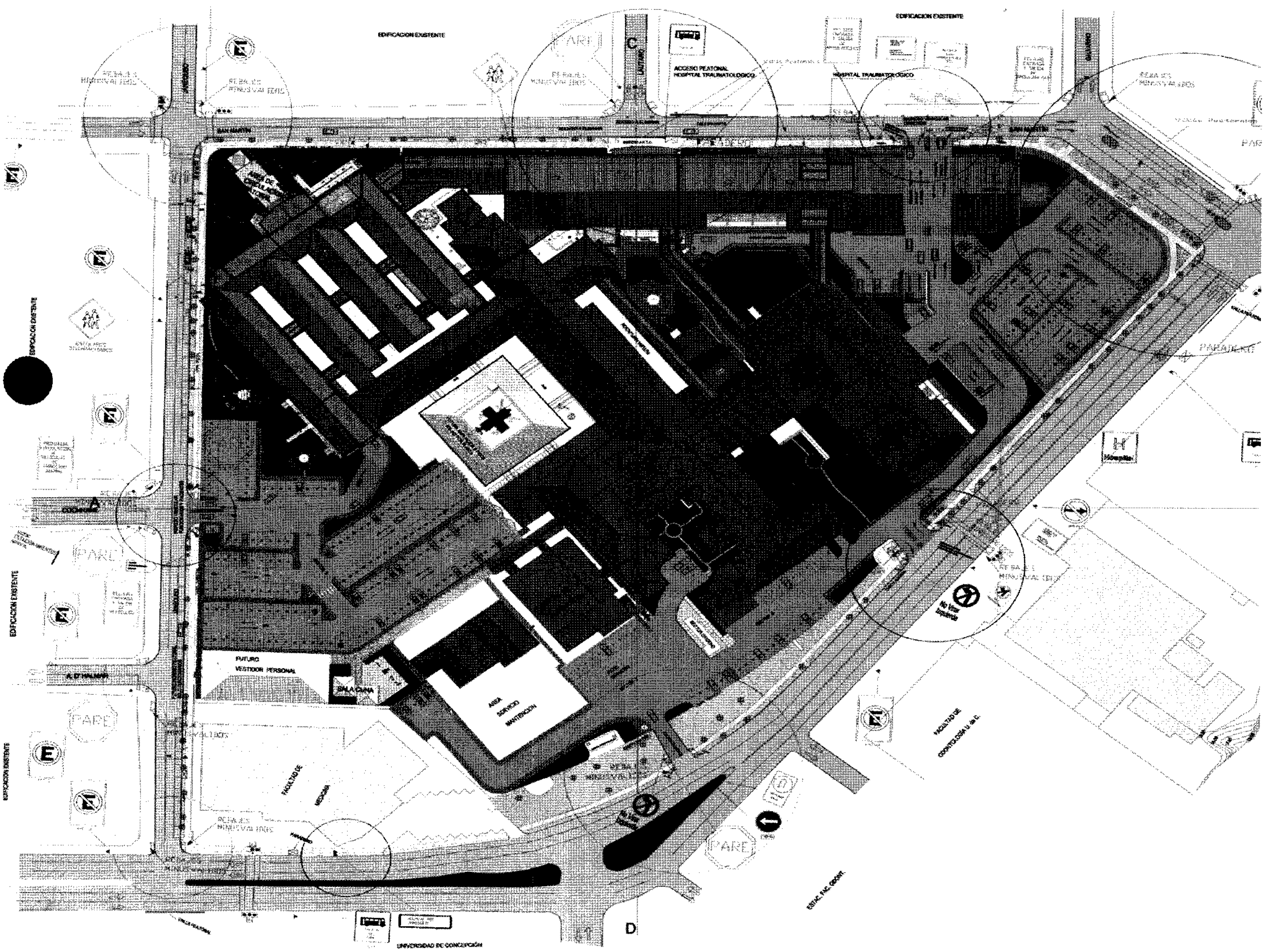


FIGURE 2-4 Bed Patient Rooms with Nursing Station

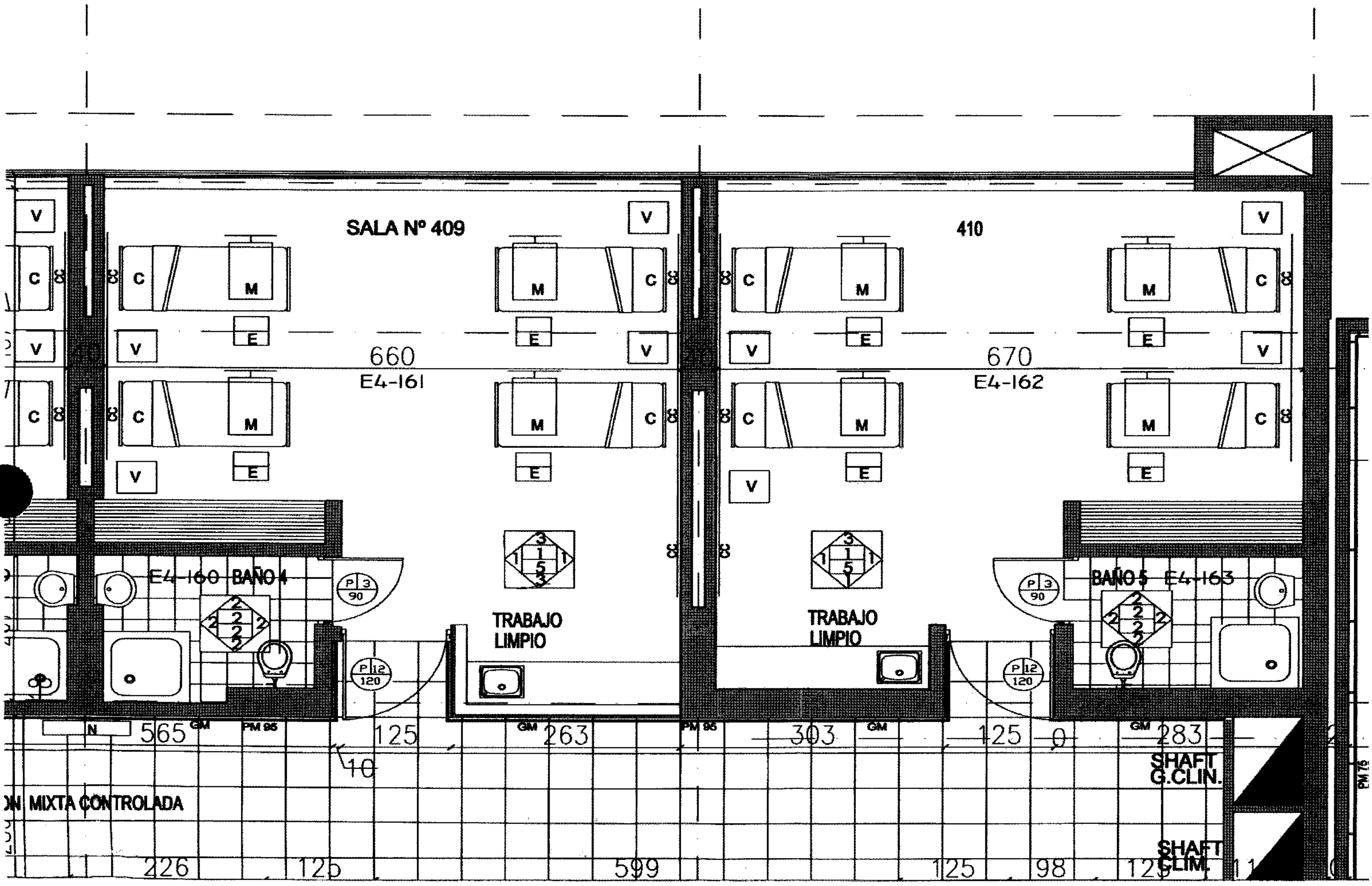


FIGURE 3 Patient Bathroom

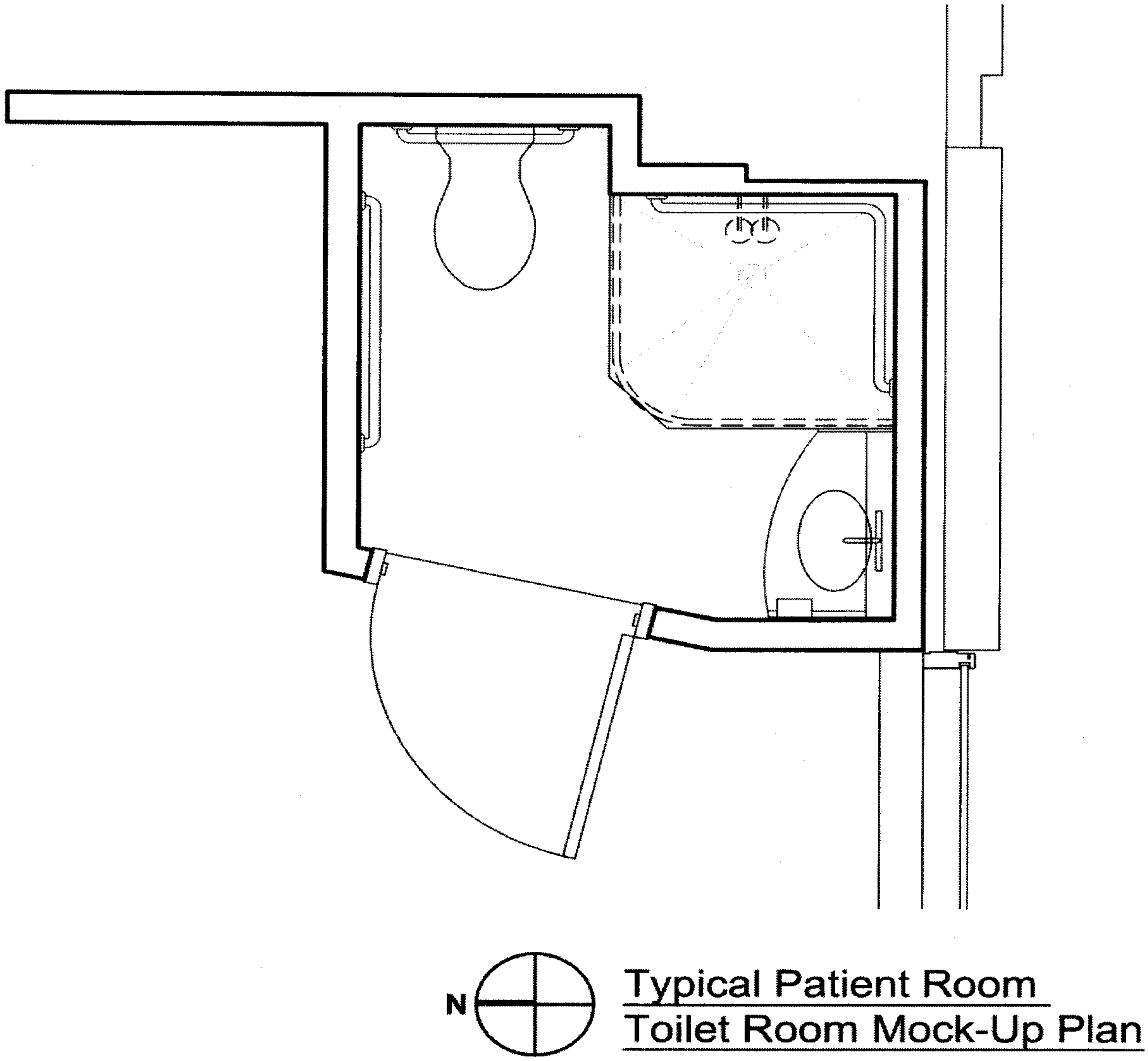


FIGURE 4

Construction Project Cost Model
Design Development Stage Estimate of Total Probable Project Cost

Component....	**Component 1**	**Component2**
Land Cost (if applicable)	______	______
Construction Cost – Site		
Abatement & Demolition	______	______
Prep, Grading & Utilities	______	______
Roads, Walks & Parking	______	______
Landscape Development	______	______
Site Signage	______	______
Other	______	______
Total	______	______
Construction Cost – Infrastructure		
Central Plant (M&E)	______	______
Medical Systems	______	______
Distribution Systems	______	______
Total	______	______
New Construction	______	______

(separately define elements as necessary)

______________	__________	__________
______________	__________	__________
Renovation	__________	__________
(separately define elements as necessary)		
______________	__________	__________
______________	__________	__________
______________	__________	__________
Total Construction Cost	__________	__________
Construction Cost Escalation	__________	__________
Medical Equipment		
Major Medical Equipment	__________	__________
Fixed Equipment	__________	__________
Movable Equipment	__________	__________
Total	__________	__________
Furniture & Non-Medical Equipment		
Fixed & Movable Equipment	__________	__________
Furniture	__________	__________
Art & Décor	__________	__________
Other	__________	__________
Total	__________	__________

Signage		
Interior Information System	________	________
Recognition	________	________
Total	________	________
Information Systems		
Telecommunications	________	________
Wide Area Network	________	________
Local Area Network	________	________
Hardware	________	________
Other	________	________
Total	________	________
Professional Fees/Administrative Costs		
Architectural & Engineering	________	________
Interior Design	________	________
Site Design and Engineering	________	________
Legal	________	________
Real Estate	________	________
Survey	________	________
Testing & Assessment	________	________
Other	________	________
____________	________	________

Total ____________ ____________

Contingency (10% of all above Costs) ** ____________

____

Financing Costs

Capitalized Interest	____________	____________
Other	____________	____________
Total	____________	____________

TOTAL PROJECT CAPITAL COST ____________ ____________

** Contingency value is in addition to contingencies that may be imbedded in the cost estimator values

ESTIMATED PROJECT SPEND RATE BY FISCAL YEAR

FY___	**FY___**	**FY___**	**FY___**	**FY___**
________	________	________	________	________

Costs for non-construction items should be based on specific purchase orders, contracts or detail estimates at this stage.

<u>Estimate of Probable Operating Expenses Associated with this Project</u>

Component…..	**Total**	**Component 1**	**Component 2**
Recruiting		____________	____________
Training		____________	____________
Relocation Costs		____________	____________
Productivity Ramp-Up		____________	____________

Other (list)	____________	____________
Escalation	____________	____________
Contingency	____________	____________

Total Associated Operating Costs ____________ ____________

III. NEXT STEPS

III. NEXT STEPS

The next steps proposed by the project team, are outlined in this section as follows:

1. Recommendations pertaining to the individual functional areas.

2. Resources for implementation of report recommendations.

3. Proposed future orientation visit.

1. <u>Recommendations pertaining to the individual functional areas</u>:

These recommendations are outlined in detail within each section of the Final Report.

2. <u>Recommendations pertaining to implementation plans arising from the report:</u>

In developing the recommendations for this proposal, various resources and opportunities have been identified as useful to aid in implementation. In addition, the client has requested that THI identify areas where it may provide assistance in implementing the identified recommendations. In response, THI has requested that the client identify some of their needs, to which THI can respond. As of the date of this report, this list has not been received by THI although from our observations, the following areas of continued assistance could be provided:

A. <u>Programmatic Strategic Planning</u>

Concepcion has specifically requested assistance with their planning process. It would appear that there are also opportunities for further development of a collaborative vision at the facilities in Santiago.

B. <u>Architectural Recommendations</u>

1. THI can help to develop a functional program outline which would include a narrative, one page summary for each department or entity describing the basis for the space program, workload projections, philosophy of operation, internal/external relationship and so forth.

2. Assistance can be provided in reviewing the architectural space program with net to gross ratios and mechanical spaces included.

3. Assistance can be provided in the review of the conceptual site plan for the preferred option.

E. Clinical/Management Recommendations

1. Assistance can be provided in the development and implementation of the physician council concept.

2. Assistance can be provided in the development and implementation of a restructured compensation and reimbursement model for primary care.

3. Assistance can be provided in the implementation of the Nursing Management Model.

4. THI can provide continued involvement in the change management process.

C. Information Systems

1. Assist in the development of Terms of Reference, analysis of proposals and/or negotiation of the ASP agreement for implementation and operation of IT systems for the Santiago and Concepcion projects.
2. Develop and coordinate an organizational readiness process to aid in managing the implementation of the new IT systems. This project would include the development of criteria for readiness team membership, identification of indicators, creation of communications tools and reporting formats and facilitation of the readiness team meetings until they are up and running under their own power.
3. Develop and implement a process and tool set to facilitate the documentation and analysis of application inventories and data flows to support facilities that are anticipating implementation of new IT systems.

D. Proposed future orientation visit

It is the understanding of Trinity Health International that the U.S. Trade and Development Agency has discussed the possibility of sponsoring an Orientation Visit (OV) to the U.S. by the Ministry of Health. THI would be happy to provide information, recommendations and resources that would contribute to the success of this visit.

In addition, it is our understanding that the Minister of Health of Chile will be traveling to the U.S. in July 2005. We would like to extend an invitation to the Minister, Santiago Venegas, and two additional team members to participate in a visit to Trinity Health corporate offices in Farmington Hills, Michigan, and some of our hospitals, at our expense, during his visit to the U.S. Robert Beyer will further discuss this invitation and the identification of the delegation with the client during the final site visit to Chile.

Goals and objectives for the visit can also be further collaboratively defined at that time.

IV. ADMINISTRATIVE REPORT

TRINITY HEALTH INTERNATIONAL

A MEMBER OF TRINITY HEALTH

Summary of Project Administrative Activities

- Notified team members of project commencement and recruited new members to replace those who could no longer participate.
- Completed authorizations and written agreements with project team members.
- Developed and submitted for approval, project workplan and timeline.
- Developed project orientation program.
- Conducted team orientation.
- Identified and contracted translation services (written and verbal).
- Received and translated documents from Chile (Spanish) into English.
- Team conducted first site visit to Chile from February 19, 2005 through March 4, 2005.
- Completed team working session for development of Interim Report (mid March).
- Team members drafted Interim Report; edited by Project Director and THI Director.
- Translation of Interim Report.
- Completed logistical arrangements for site visits one and two.
- Held discussions with both USTDA representatives and MINSA representatives regarding contractual issues.
- Drafted, compiled and completed Interim and Final Reports

V. APPENDICES

A.1

SJMLH Core Measures - AMI

	Aspirin within 24 Hours of Arrival (AM-1)			Aspirin Prescribed at Discharge (AM-2)			ACEI for LVSD at Discharge (AM-3)			Smoking Cessation Advice / Counseling (AM-4)			Beta Blocker Prescribed at Discharge (AM-5)			Beta Blocker within 24 Hous of Arrival (AM-6)			PCI within 120 Minutes (AM-8a)			Inpatient Mortality (AM-9)		
JCAHO Comparative Rate*			94.1%			94.0%			78.5%			80.1%			91.1%			88.3%						9.9%
MHA Top Quartile**			100.0%			100.0%			100.0%			100.0%			100.0%			100.0%						0.0%
MHA Median**			100.0%			100.0%			90.9%			100.0%			100.0%			100.0%						3.9%
SJMLH FY04			96.8%			93.9%			85.7%			NA			100.0%			90.3%						21.4%
	Num	Den	Actual Rate	Num	Den	Actual Rate	Num	Den	Actual Rate	Num	Den	Actual Rate	Num	Den	Actual Rate	Num	Den	Actual Rate	Num	Den	Actual Rate	Num	Den	Actual Rate
FEB04	10	10	100.0%	7	8	87.5%	0	0	.	0	0	.	8	8	100.0%	6	7	85.7%	0	0	.	1	9	11.1%
MAR04	5	6	83.3%	4	4	100.0%	2	2	100.0%	0	0	.	4	4	100.0%	2	2	100.0%	0	0	.	0	4	0.0%
APR04	9	9	100.0%	5	5	100.0%	0	0	.	0	0	.	6	6	100.0%	0	0	.	0	0	.	1	7	14.3%
MAY04	7	7	100.0%	3	3	100.0%	2	2	100.0%	0	1	0.0%	5	5	100.0%	3	4	75.0%	0	0	.	2	7	28.6%
JUN04	6	6	100.0%	3	3	100.0%	1	1	100.0%	1	1	100.0%	3	3	100.0%	2	2	100.0%	0	0	.	0	4	0.0%
JUL04	3	3	100.0%	2	2	100.0%	2	2	100.0%	1	1	100.0%	3	3	100.0%	3	3	100.0%	0	0	.	0	3	0.0%
AUG04	10	10	100.0%	4	5	80.0%	0	0	.	0	0	.	7	7	100.0%	8	9	88.9%	0	0	.	0	7	0.0%
SEP04	5	5	100.0%	1	1	100.0%	0	0	.	0	0	.	0	0	.	2	2	100.0%	0	0	.	0	1	0.0%
OCT04	5	5	100.0%	3	4	75.0%	1	1	100.0%	0	0	.	5	5	100.0%	3	3	100.0%	0	0	.	1	6	16.7%
NOV04	3	3	100.0%	1	1	100.0%	0	0	.	0	0	.	0	0	.	1	1	100.0%	0	0	.	0	1	0.0%
DEC04	3	3	100.0%	2	2	100.0%	0	0	.	0	0	.	4	4	100.0%	1	2	50.0%	0	0	.	1	6	16.7%
JAN05	7	7	100.0%	4	4	100.0%	0	0	.	0	0	.	3	3	100.0%	3	3	100.0%	0	0	.	1	6	16.7%
SJMLH 12 month Average			98.6%			92.9%			100.0%			66.7%			100.0%			89.5%			#DIV/0!			11.5%
SJMLH 6 month Average			100.0%			88.2%			100.0%			#DIV/0!			100.0%			90.0%			#DIV/0!			11.1%

*Based on Jan-Mar 2004 National JCAHO data
** Based on Jul-Sep 2004 MHA data
CO_LC_APR05_v2

SJMLH Core Measures - Heart Failure

	Discharge Instructions (HF-1)			LVF Assessment (HF-2)			ACEI for LVSD at Discharge (HF-3)			Smoking Cessation Advice / Counseling (HF-4)		
JCAHO Comparative Rate*			44.3%			86.0%			76.0%			62.6%
MHA top quartile**			82.8%			100.0%			100.0%			100.0%
MHA Median**			60.0%			92.9%			81.8%			90.0%
SJMLH FY04			90.8%			97.2%			85.7%			100.0%
	Num	Den	Actual Rate	Num	Den	Actual Rate	Num	Den	Actual Rate	Num	Den	Actual Rate
FEB04	7	7	100.0%	9	10	90.0%	2	3	66.7%	0	0	.
MAR04	3	3	100.0%	7	7	100.0%	2	2	100.0%	3	3	100.0%
APR04	9	9	100.0%	11	11	100.0%	0	0	.	1	1	100.0%
MAY04	4	4	100.0%	5	5	100.0%	0	1	0.0%	1	1	100.0%
JUN04	1	1	100.0%	3	3	100.0%	1	1	100.0%	0	0	.
JUL04	10	12	83.3%	14	14	100.0%	2	2	100.0%	0	0	.
AUG04	6	6	100.0%	6	6	100.0%	1	2	50.0%	1	1	100.0%
SEP04	9	10	90.0%	11	11	100.0%	3	3	100.0%	0	0	.
OCT04	8	8	100.0%	9	9	100.0%	1	1	100.0%	0	0	.
NOV04	10	10	100.0%	10	11	90.9%	1	1	100.0%	1	1	100.0%
DEC04	9	11	81.8%	12	14	85.7%	2	2	100.0%	2	2	100.0%
JAN05	9	11	81.8%	22	22	100.0%	3	3	100.0%	0	0	.
SJMLH 12 month Average			92.4%			96.7%			85.7%			100.0%
SJMLH 6 month Average			91.1%			95.9%			91.7%			100.0%

*Based on Jan-Mar 2004 National JCAHO data
** Based on Jul-Sep 2004 MHA data
CO_LC_APR05_v2

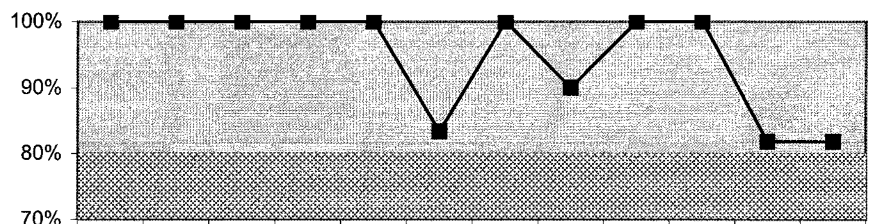
SJMLH Core Measures - Community Acquired Pneumonia

	Oxygenation Assessment within 24 Hours (PN-1)			Pneumonia Screen and/or Vaccination (PN-2)			Blood Cultures Prior to 1st Dose of Antibiotic (PN-3b)			Smoking Cessation Advice/ Counseling (PN-4a)			Initial Antibiotic within 4 Hours (PN-5b)			Antibiotic Selection (PN-6a and b)			Influenza Vaccination (PN-7)		
JCAHO Comparative Rate*			98.2%			44.0%			81.5%			58.2%									NA
MHA top quartile**			100.0%			77.8%			100.0%			100.0%									NA
MHA Median**			100.0%			55.6%			88.9%			80.0%									NA
SJMLH FY04			100.0%			83.5%			89.2%			72.7%									80.9%
	Num	Den	Actual Rate	Num	Den	Actual Rate	Num	Den	Actual Rate	Num	Den	Actual Rate	Num	Den	Actual Rate	Num	Den	Actual Rate	Num	Den	Actual Rate
FEB04	13	13	100.0%	7	9	77.8%	11	12	91.7%	2	2	100.0%	13	13	100.0%	8	10	80.0%	6	9	66.7%
MAR04	21	21	100.0%	14	15	93.3%	19	20	95.0%	2	2	100.0%	18	21	85.7%	12	17	70.6%	0	0	.
APR04	19	19	100.0%	11	14	78.6%	16	17	94.1%	1	1	100.0%	15	19	78.9%	8	11	72.7%	0	0	.
MAY04	13	13	100.0%	7	10	70.0%	10	13	76.9%	2	3	66.7%	10	13	76.9%	8	10	80.0%	0	0	.
JUN04	12	12	100.0%	7	9	77.8%	10	11	90.9%	2	2	100.0%	9	12	75.0%	7	9	77.8%	0	0	.
JUL04	8	9	88.9%	6	6	100.0%	6	8	75.0%	4	4	100.0%	5	5	100.0%	6	7	85.7%	0	0	.
AUG04	12	12	100.0%	3	7	42.9%	11	11	100.0%	5	5	100.0%	9	10	90.0%	7	12	58.3%	0	0	.
SEP04	16	16	100.0%	11	13	84.6%	11	11	100.0%	5	5	100.0%	7	9	77.8%	10	11	90.9%	0	0	.
OCT04	13	13	100.0%	9	11	81.8%	8	9	88.9%	0	0	.	10	13	76.9%	8	10	80.0%	6	11	54.5%
NOV04	8	8	100.0%	5	5	100.0%	6	6	100.0%	4	4	100.0%	5	5	100.0%	4	7	57.1%	3	6	50.0%
DEC04	22	22	100.0%	14	16	87.5%	13	15	86.7%	3	6	50.0%	16	17	94.1%	15	17	88.2%	17	19	89.5%
JAN05	13	13	100.0%	8	9	88.9%	12	13	92.3%	1	1	100.0%	8	10	80.0%	10	12	83.3%	8	11	72.7%
SJMLH 12 month Average			99.4%			82.3%			91.1%			88.6%			85.0%			77.4%			71.4%
SJMLH 6 month Average			100.0%			82.0%			93.8%			85.7%			85.9%			78.3%			72.3%

*Based on Jan-Mar 2004 National JCAHO data
**Based on Jul-Sep 2004 MHA data

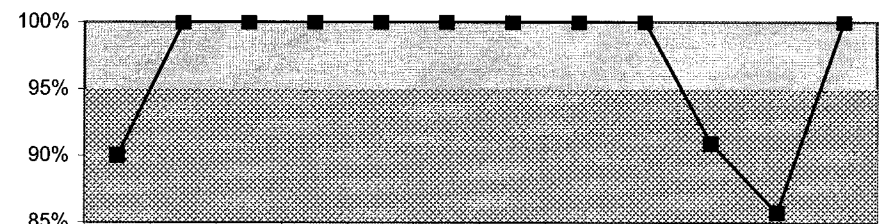
SJMLH CHF Core Measures
April 2005

Discharge Instructions



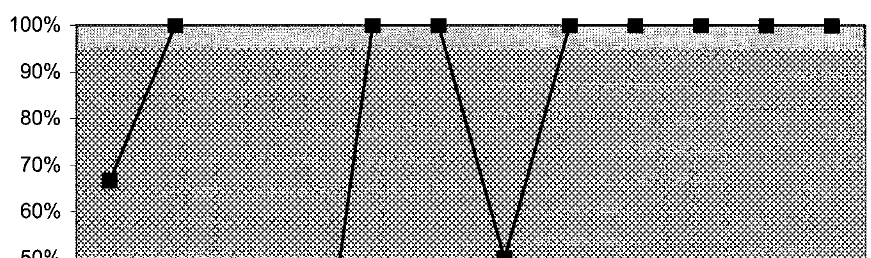
	FEB 04	MAR 04	APR 04	MAY 04	JUN 04	JUL 04	AUG 04	SEP 04	OCT 04	NOV 04	DEC 04	JAN 05
Target	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
Data	100.0	100.0	100.0	100.0	100.0	83.3%	100.0	90.0%	100.0	100.0	81.8%	81.8%

LVF Assessment



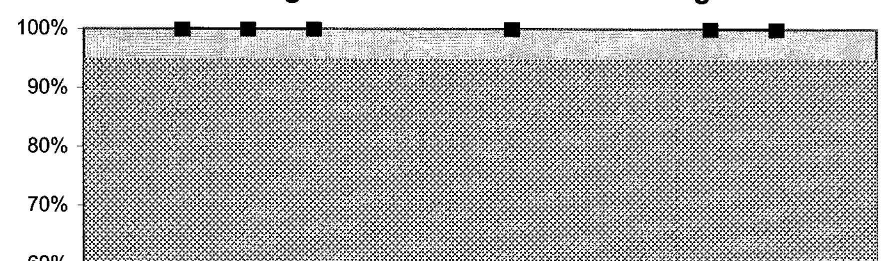
	FEB 04	MAR 04	APR 04	MAY 04	JUN 04	JUL 04	AUG 04	SEP 04	OCT 04	NOV 04	DEC 04	JAN 05
Target	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
Data	90.0%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	90.9%	85.7%	100.0

ACEI for LVSD at Discharge



	FEB 04	MAR 04	APR 04	MAY 04	JUN 04	JUL 04	AUG 04	SEP 04	OCT 04	NOV 04	DEC 04	JAN 05
Target	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
Data	66.7%	100.0		0.0%	100.0	100.0	50.0%	100.0	100.0	100.0	100.0	100.0

Smoking Cessation Advice/Counseling

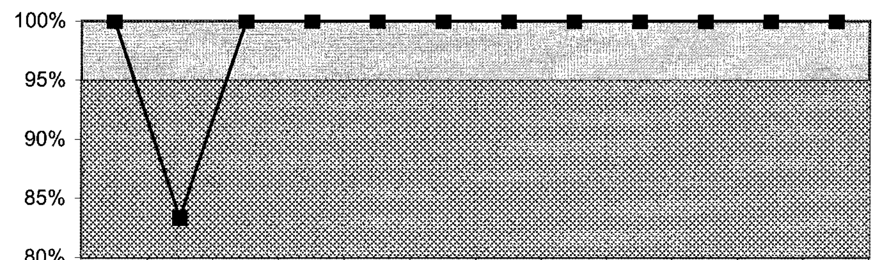


	FEB 04	MAR 04	APR 04	MAY 04	JUN 04	JUL 04	AUG 04	SEP 04	OCT 04	NOV 04	DEC 04	JAN 05
Target	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
Data		100.0	100.0	100.0			100.0			100.0	100.0	

Target set at 2004 BCBSM Performance Incentive Level

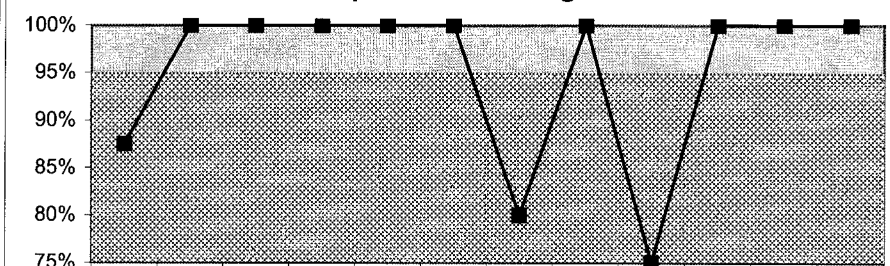
SJMLH AMI Core Measures
April 2005

Aspirin on Arrival



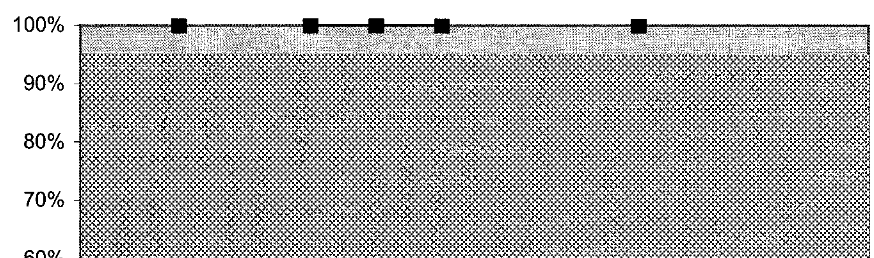
	FEB 04	MAR 04	APR 04	MAY 04	JUN 04	JUL 04	AUG 04	SEP 04	OCT 04	NOV 04	DEC 04	JAN 05
Target	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
Data	100.0	83.3%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Aspirin at Discharge



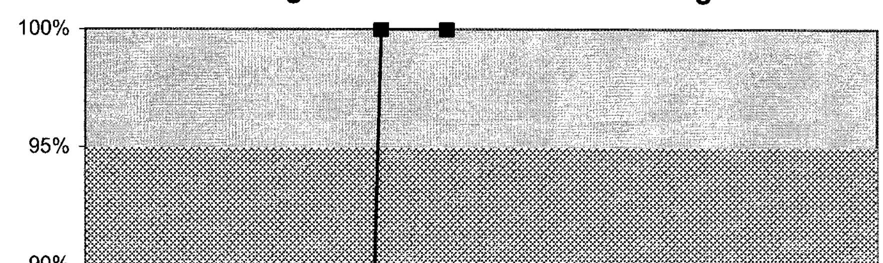
	FEB 04	MAR 04	APR 04	MAY 04	JUN 04	JUL 04	AUG 04	SEP 04	OCT 04	NOV 04	DEC 04	JAN 05
Target	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
Data	87.5%	100.0	100.0	100.0	100.0	100.0	80.0%	100.0	75.0%	100.0	100.0	100.0

ACEI for LVSD at Discharge



	FEB 04	MAR 04	APR 04	MAY 04	JUN 04	JUL 04	AUG 04	SEP 04	OCT 04	NOV 04	DEC 04	JAN 05
Target	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
Data		100.0		100.0	100.0	100.0			100.0			

Smoking Cessation Advice/Counseling

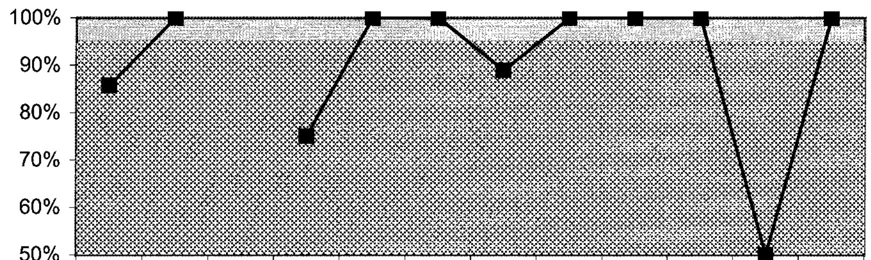


	FEB 04	MAR 04	APR 04	MAY 04	JUN 04	JUL 04	AUG 04	SEP 04	OCT 04	NOV 04	DEC 04	JAN 05
Target	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
Data				0.0%	100.0	100.0						

Target set at 2004 BCBSM Performance Incentive Level

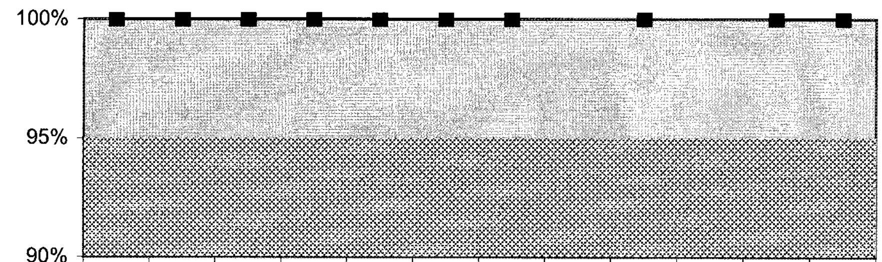
SJMLH AMI Core Measures
April 2005

Beta Blocker on Arrival



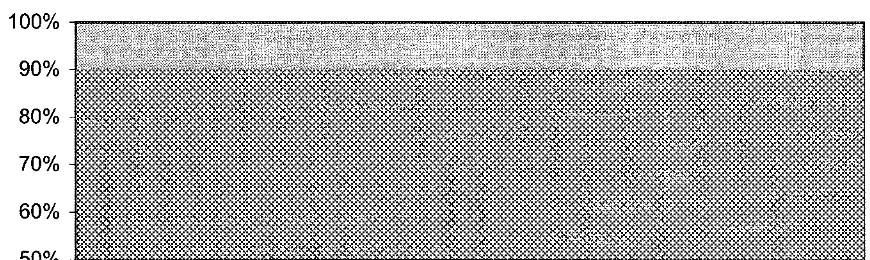
	FEB 04	MAR 04	APR 04	MAY 04	JUN 04	JUL 04	AUG 04	SEP 04	OCT 04	NOV 04	DEC 04	JAN 05
Target	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
Data	85.7%	100.0		75.0%	100.0	100.0	88.9%	100.0	100.0	100.0	50.0%	100.0

Beta Blocker at Discharge



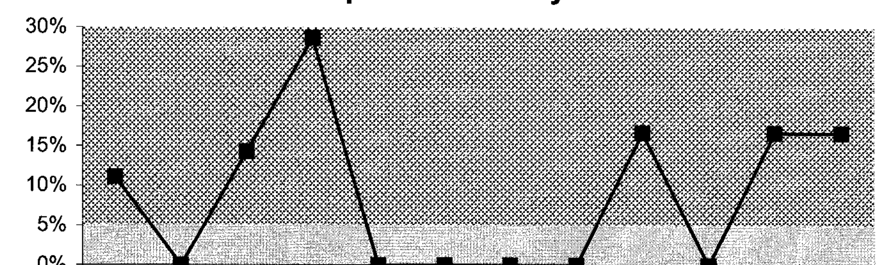
	FEB 04	MAR 04	APR 04	MAY 04	JUN 04	JUL 04	AUG 04	SEP 04	OCT 04	NOV 04	DEC 04	JAN 05
Target	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
Data	100.0	100.0	100.0	100.0	100.0	100.0	100.0		100.0		100.0	100.0

PCI within 120 minutes



	FEB 04	MAR 04	APR 04	MAY 04	JUN 04	JUL 04	AUG 04	SEP 04	OCT 04	NOV 04	DEC 04	JAN 05
Target	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Data	0.0%											

Inpatient Mortality

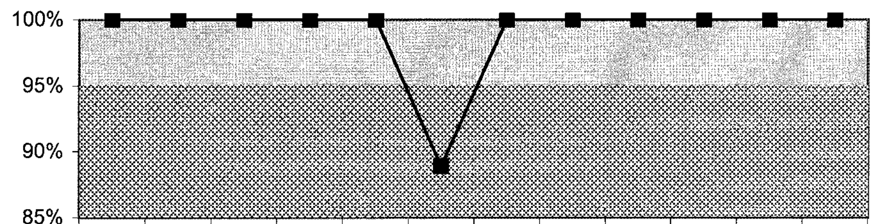


	FEB 04	MAR 04	APR 04	MAY 04	JUN 04	JUL 04	AUG 04	SEP 04	OCT 04	NOV 04	DEC 04	JAN 05
Target	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Data	11.1%	0.0%	14.3%	28.6%	0.0%	0.0%	0.0%	0.0%	16.7%	0.0%	16.7%	16.7%

Target set at 2004 BCBSM Performance Incentive Level

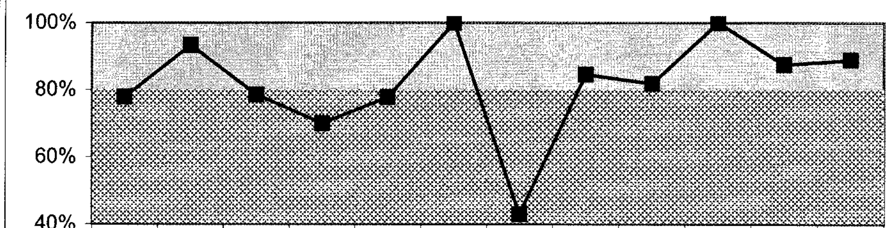
SJMLH CAP Core Measures
April 2005

Oxygenation Assessment within 24 hours



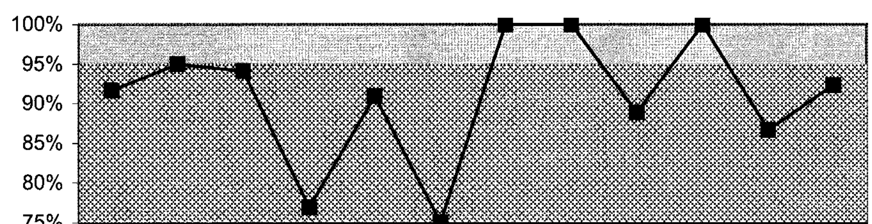
	FEB 04	MAR 04	APR 04	MAY 04	JUN 04	JUL 04	AUG 04	SEP 04	OCT 04	NOV 04	DEC 04	JAN 05
Target	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
Data	100.0	100.0	100.0	100.0	100.0	88.9%	100.0	100.0	100.0	100.0	100.0	100.0

Pneumonia Screen/Vaccination



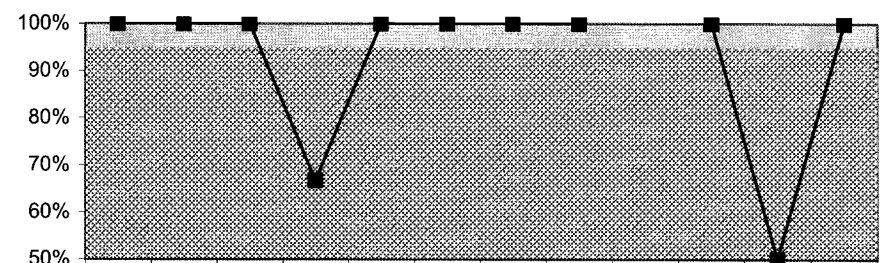
	FEB 04	MAR 04	APR 04	MAY 04	JUN 04	JUL 04	AUG 04	SEP 04	OCT 04	NOV 04	DEC 04	JAN 05
Target	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
Data	77.8%	93.3%	78.6%	70.0%	77.8%	100.0	42.9%	84.6%	81.8%	100.0	87.5%	88.9%

Blood Cultures prior to Antibiotic



	FEB 04	MAR 04	APR 04	MAY 04	JUN 04	JUL 04	AUG 04	SEP 04	OCT 04	NOV 04	DEC 04	JAN 05
Target	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
Data	91.7%	95.0%	94.1%	76.9%	90.9%	75.0%	100.0	100.0	88.9%	100.0	86.7%	92.3%

Smoking Cessation Advice/Counseling

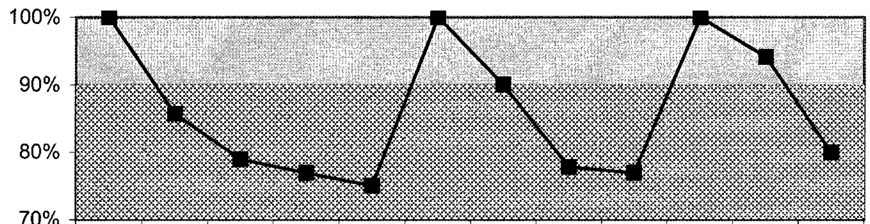


	FEB 04	MAR 04	APR 04	MAY 04	JUN 04	JUL 04	AUG 04	SEP 04	OCT 04	NOV 04	DEC 04	JAN 05
Target	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
Data	100.0	100.0	100.0	66.7%	100.0	100.0	100.0	100.0		100.0	50.0%	100.0

Target set at 2004 BCBSM Performance Incentive Level

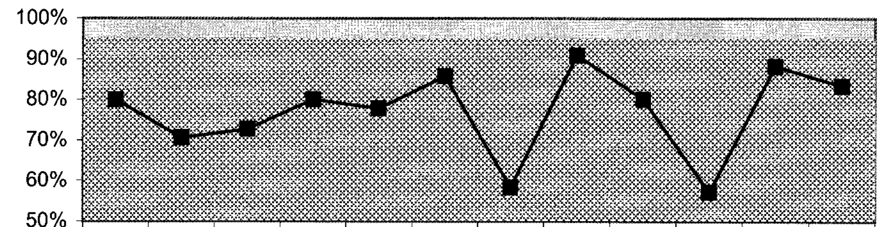
SJMLH CAP Core Measures
April 2005

Initial Antibiotic within 4 hours



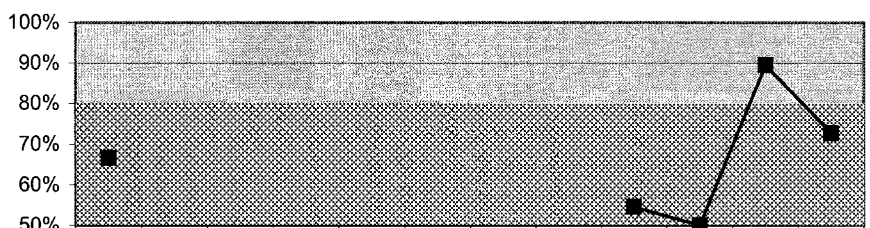
	FEB 04	MAR 04	APR 04	MAY 04	JUN 04	JUL 04	AUG 04	SEP 04	OCT 04	NOV 04	DEC 04	JAN 05
Target	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Data	100.0	85.7%	78.9%	76.9%	75.0%	100.0	90.0%	77.8%	76.9%	100.0	94.1%	80.0%

Antibiotic Selection



	FEB 04	MAR 04	APR 04	MAY 04	JUN 04	JUL 04	AUG 04	SEP 04	OCT 04	NOV 04	DEC 04	JAN 05
Target	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
Data	80.0%	70.6%	72.7%	80.0%	77.8%	85.7%	58.3%	90.9%	80.0%	57.1%	88.2%	83.3%

Influenza Vaccination



	FEB 04	MAR 04	APR 04	MAY 04	JUN 04	JUL 04	AUG 04	SEP 04	OCT 04	NOV 04	DEC 04	JAN 05
Target	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
Data	66.7%								54.5%	50.0%	89.5%	72.7%

Target set at 2004 BCBSM Performance Incentive Level

A.2

Suggestions for Building Resilience

Change Management Seminar

Trinity Health International

April 2005

From *Managing at the Speed of Change,* Daryl Conner

Five key principles in the "Nature of Change" pattern

When involved in major organizational change, you can embrace resilience if you:

1. Realize that control is what we all seek in our lives, and the ambiguity caused by the disruption of expectations is what we all fear and avoid.
2. Are able to exercise some degree of direct or indirect control over what happens during the implementation of change.
3. Can assimilate change at a speed commensurate with the pace of the events taking place around you.
4. Understand the micro implications of organizational or macro change.
5. Face a total assimilation demand from the micro, organizational, and macro transitions in your life that is within your absorption limits.

From *Managing at the Speed of Change*, Daryl Conner

Six key principles in the "Process of Change" pattern

When involved in major organizational change, you can enhance resilience if you:

1. Approach change as an unfolding process rather than a binary (either/or) event.
2. Accept that you will either pay for getting what you want or you will pay for not getting what you want and the payments may come early or late—but change is expensive and you *will* pay.
3. Believe the status quo is far more expensive than the cost of transition.
4. Accept the discomfort of ambiguity as a natural reaction to transition.
5. Are attracted to remedies you see as accessible.
6. Are presented with changes in a manner that takes into account your frame of reference.

From *Managing at the Speed of Change,* Daryl Conner

Five key principles in the "Resistance to Change" pattern

When involved in major organizational change, you can enhance resilience if you:

1. Understand the basic mechanisms of human resistance.
2. View resistance as a natural and inevitable reaction to the disruption of expectations.
3. Interpret resistance as a deficiency of either ability or willingness.
4. Encourage and participate in overt expressions of resistance.
5. Understand that resistance to positive changes is just as common as resistance to negatively perceived change and that both reactions follow their own respective sequence of events, which can be anticipated and managed.

From *Managing at the Speed of Change,* Daryl Conner

Four key principles in the "Commitment to Change" pattern

When involved in major organizational change, you can enhance resilience if you:

1. Realize the sequence of steps involved in committing to something new.
2. Are provided with the time and appropriate involvement to become emotionally as well as intellectually committed to change.
3. Are sponsored by people who invest the time, resources, and effort to assure specific plans are developed that will increase the likelihood people will commit to change.
4. Understand that commitment to a major change is always expensive, and that you either pay for achieving it or pay for not having it.

From *Managing at the Speed of Change*, Daryl Conner

Three key principles in the "Culture and Change" pattern

When involved in major organizational change, you can enhance resilience if you:

1. Understand the powerful effect culture has on the outcome of any major change effort.
2. Know that major changes introduced into an organization must be supported by the organization's overall culture and its local subculture.
3. Recognize that when counter cultural changes are introduced, you must alter the existing culture to support the new initiative.

From *Managing at the Speed of Change*, Daryl Conner

Three key principles in the "Synergy and Change" pattern

When involved in major organizational change, you can enhance resilience if you:

1. Recognize how important synergy is to the success of change.
2. Are willing (common goals and interdependence) and able (empowerment and participation) to join with others in efforts that produce a $1 + 1 > 2$ equation.
3. Can listen to, value, integrate with and apply perspectives different from your own.

From *Managing at the Speed of Change,* Daryl Conner

A. 3

Salvador Infante Hospital Complex

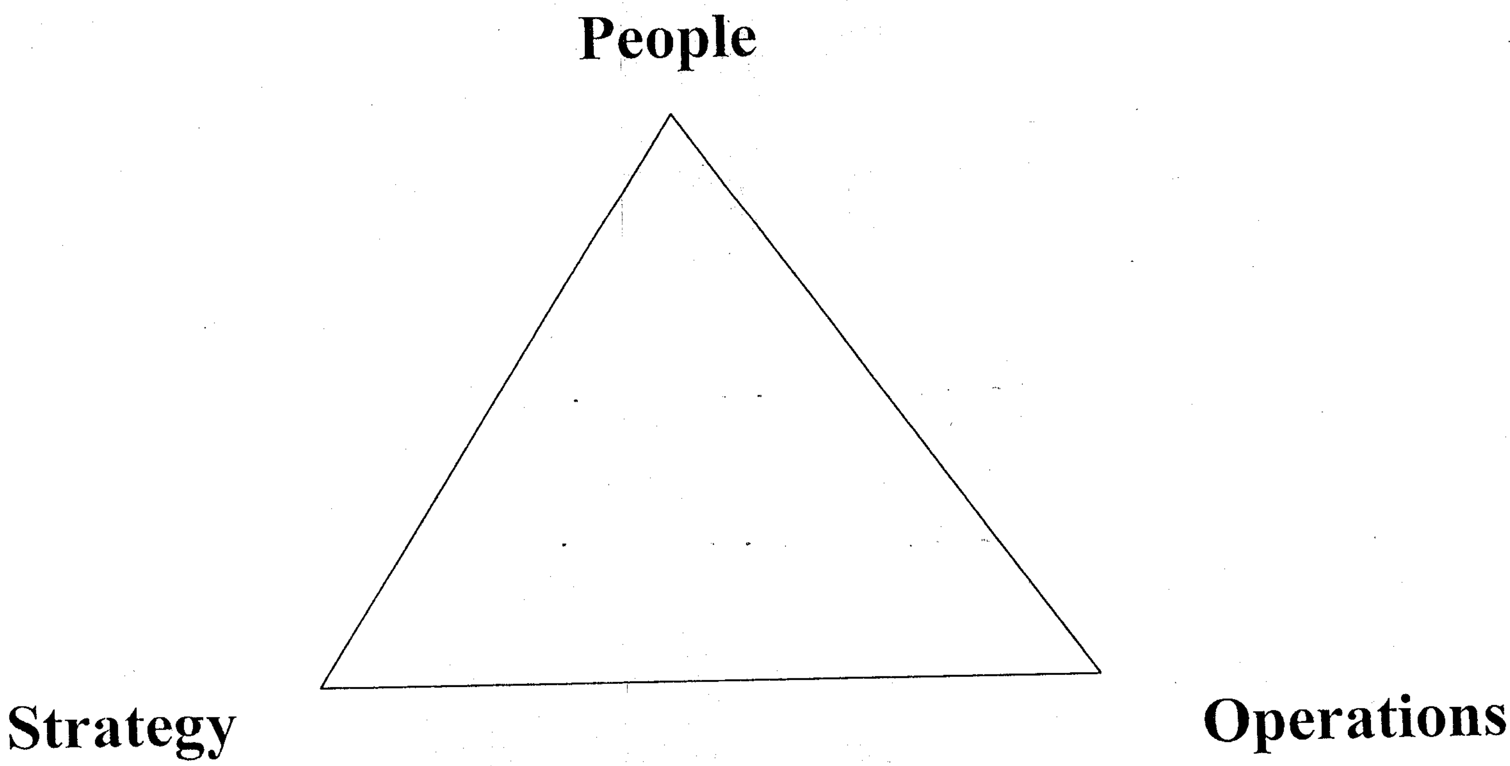
Change Management Seminar

Trinity International Health

April 2005

INSIGHT STRATEGIES

Organizational Core Processes…



INSIGHT STRATEGIES

The changing role of management…

The new model of leadership…

TRADITIONAL LEADER		***TEAM* LEADER**
Manage	→	Lead
Tell	→	Listen
Direct	→	Ask Questions
Convince	→	Discuss
Decide/Provide Answers	→	Facilitate
Control	→	Coach
Supervise	→	Release initiative & creativity in others

INSIGHT

Control-Oriented Conversations

Frame (how we see things)	**Actions**	**Problem Results**
I know what is right.	Assert my opinion.	People feel manipulated.
Get them to do it my way.	Take the rightness of my view for granted.	Low commitment.
Those who disagree are wrong or don't care.	Minimize inquiry into others' views.	Failure to capture the best thinking.
Avoid upsetting anyone.	Ask leading questions.	Stifles honest communication.
		Minimal learning.

INSIGHT STRATEGIES

Learning-Oriented Conversations

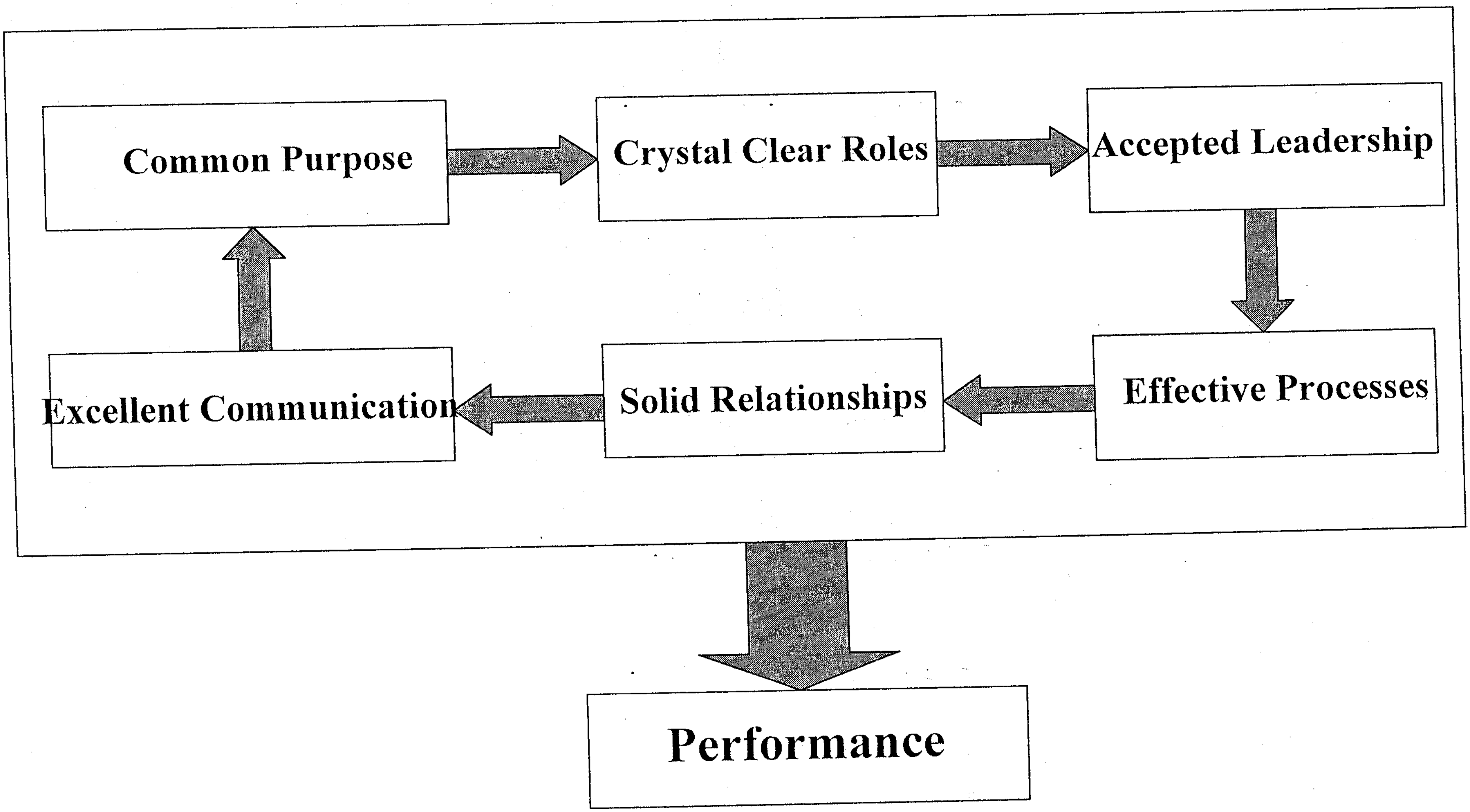
Frame (how we see things)	**Actions**	**More Probable Results**
They may see something I don't and vise versa.	Explain the reasoning and data behind my views.	Decisions based on best available thinking and data.
Value objectivity and learning over winning and losing.	Invite inquiry into my views.	Shared commitment to decisions.
Disagreements are puzzles to be explored.	Genuinely inquire into others' thinking.	Learning from differences and other perspectives.
Respectful challenges of our views are not attacks.	Make differences and dilemmas discussable.	Responsible and effective participatory culture.

INSIGHT STRATEGIES

Teams...

INSIGHT

Characteristics of a High Performance Team...*MacMillan*

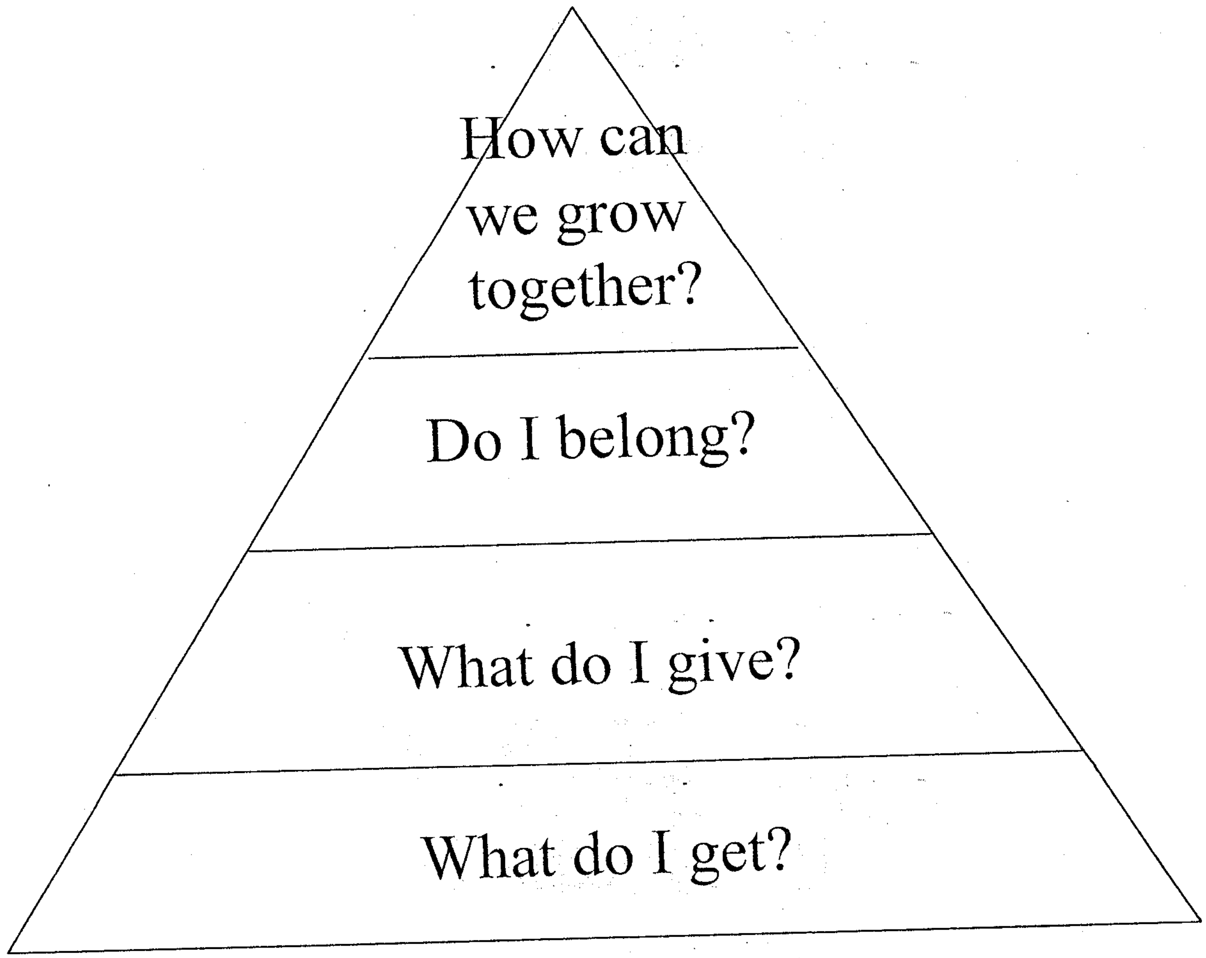


A Team is

A group of people
Committed to
A common purpose
Who Choose to
Cooperate in order
To achieve

Exceptional
Results.

The Hierarchy When Joining a Team



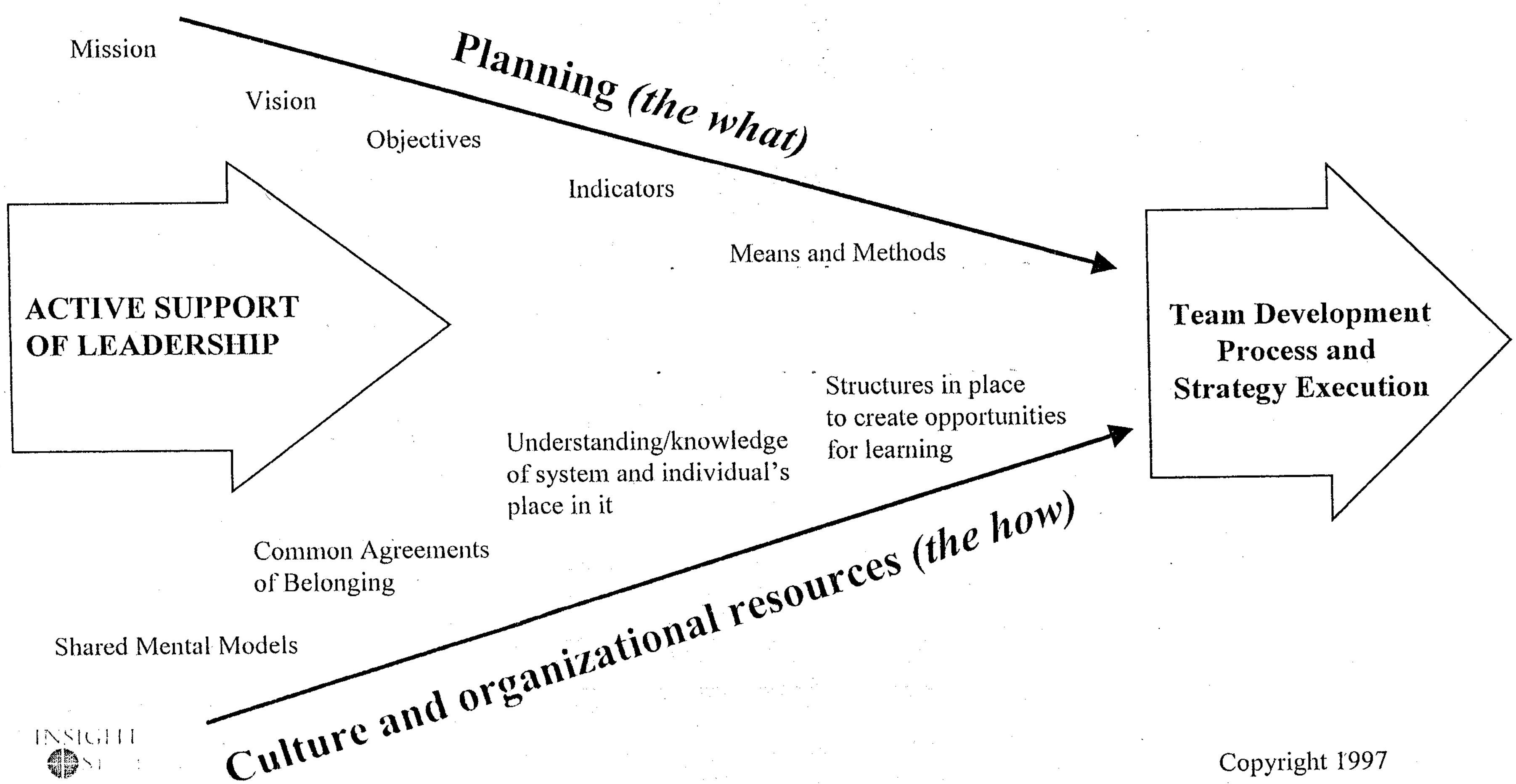
INSIGHT STRATEGIES

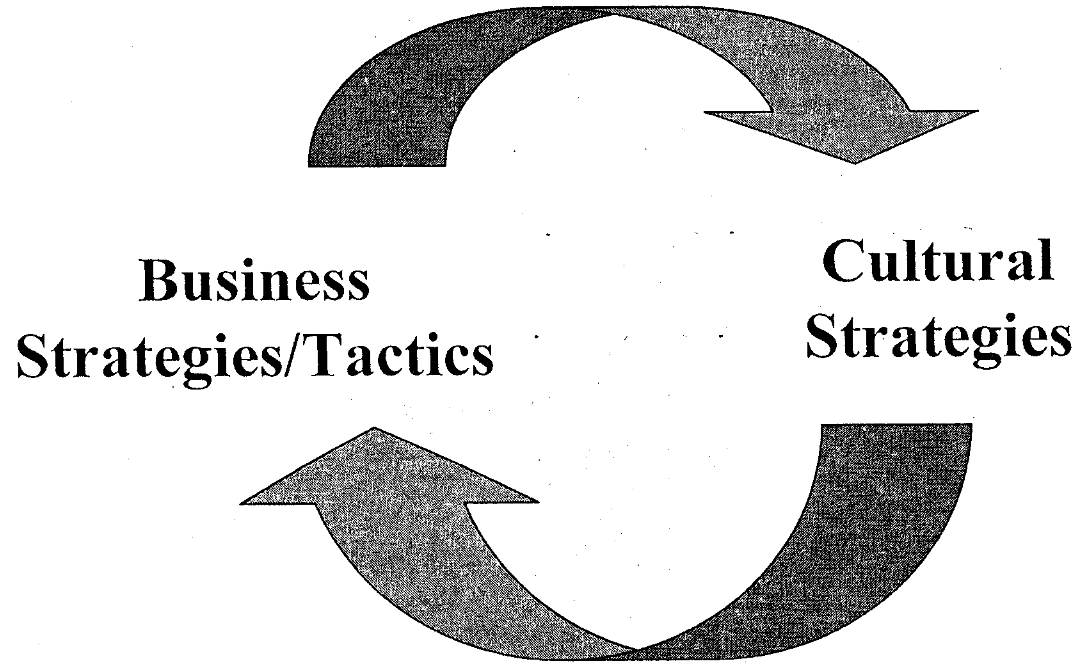
Culture as a strategic imperative…

An organization's strategic plan is unlikely to be implemented, much less sustained, unless there is an appropriate organizational culture in place to support the strategy.

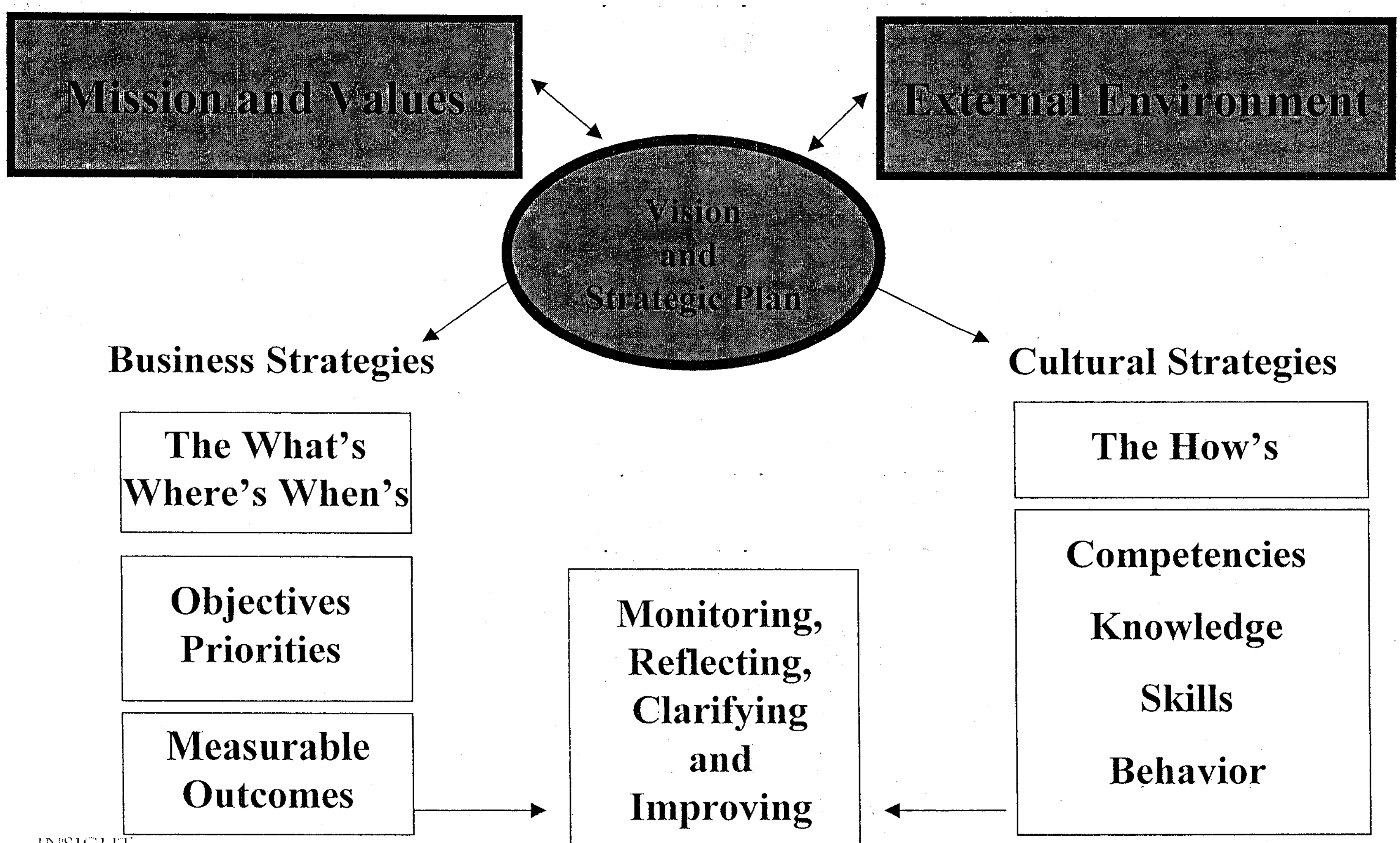
Hay Management Group Study

Creating A Coherent Team





Mindful Management—*growing organizational capacity while addressing the business issues*



INSIGHT STRATEGIES

VISION

Structural
Tension

**CURRENT
REALITY**

Focus on what
we want to create

CREATIVE TENSION

EMOTIONAL TENSION

Focus on getting rid of
what we don't want

Learning Organization

- A learning organization is:
  - Continually expanding its capacity to create its future (not bound by past successes and failures)
  - Able to do what it was never able to do before
  - Changing how it thinks and acts

Learning is an intentional choice. (it takes time, effort, you have to put the structures in place for it to happen. . .)

Conversation as a core business process…

One measure of organizational culture is how well we can converse with each other.

A key element of execution is an ongoing, *robust* dialogue in the organization that:

1. includes a rigorous process of asking how, why and what
2. holds people accountable
3. insists on realism…exposing reality, and acting on it

Tips for Productive Conversations

- Value objectivity and learning over set positions
- Discuss relevant "undiscussable" issues
- Assume that you might be missing something
- Inquire into the reasoning of others
- Question your own conclusions and invite others to do so
- Explain the data or logic that leads to your conclusions
- Look for your own contribution to the problem
- Remember the importance of paraphrasing

Important Blind Spots

- **We tend to be aware of our own good intentions and not see the features of our behavior that have a non-productive effect on others.**
- **We tend to be very aware of the non-productive behavior of others but can't see so clearly their intentions.**
- **Therefore, we tend to see ourselves as sincerely trying to do what's right and, when frustrated by others, we attribute intentions to them that are less noble and less sincere than our own and *they are doing the same to us.***

Working with Dilemmas

- Assume everyone thinks they're acting sensibly.
- Seek to understand how others see the situation.
- Explain how you see the situation.
- Seek to understand your own and others' dilemmas.
- Identify consequences without attributing intent.
- Work jointly to design more effective action.

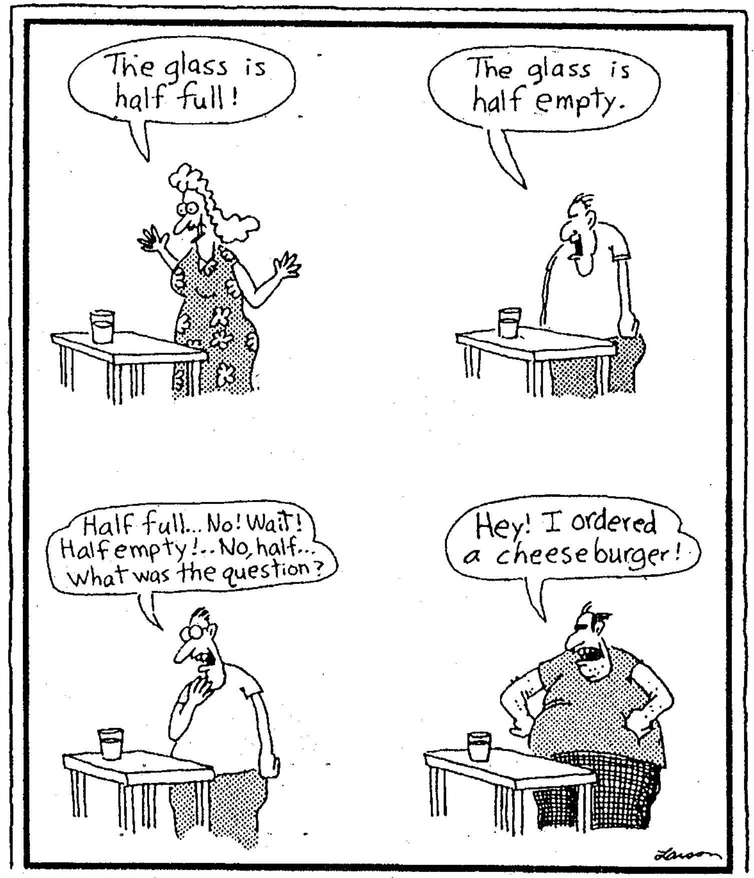
Acting Consistently

- The team as a group, and every member of the team individually, MUST develop the habits it wants to reinforce/encourage in the culture in order for the organization to be successful and act consistently to that end.

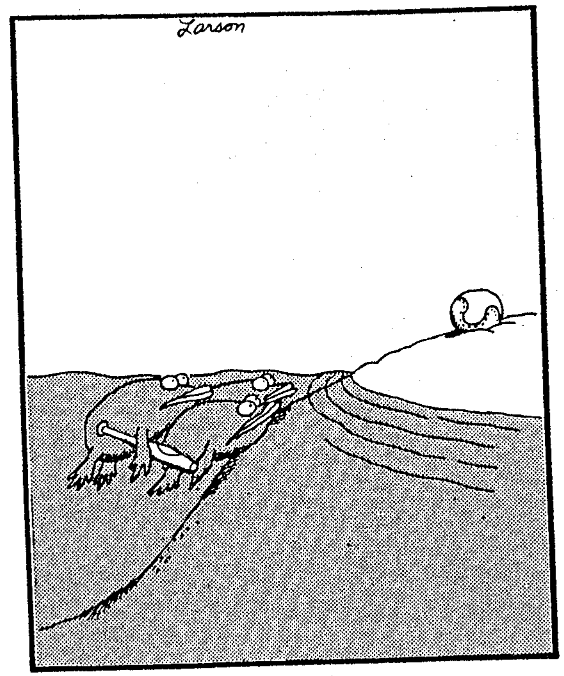
- You can't talk your way out of something you behave yourself into.

Managing Change

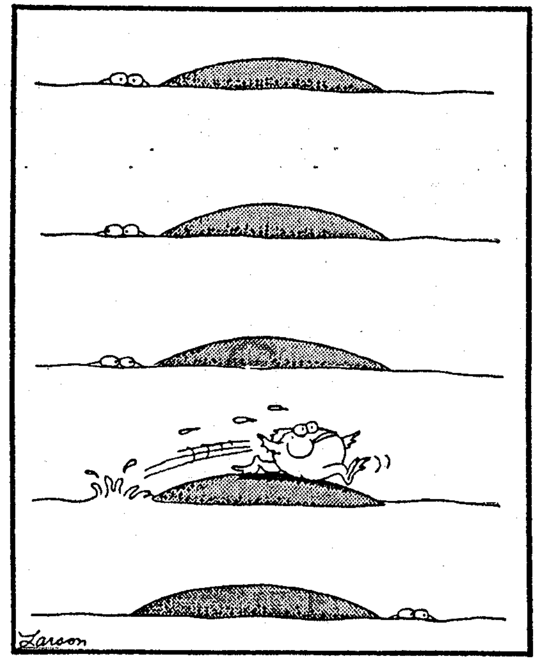
INSIGHT STRATEGIES



The four basic personality types



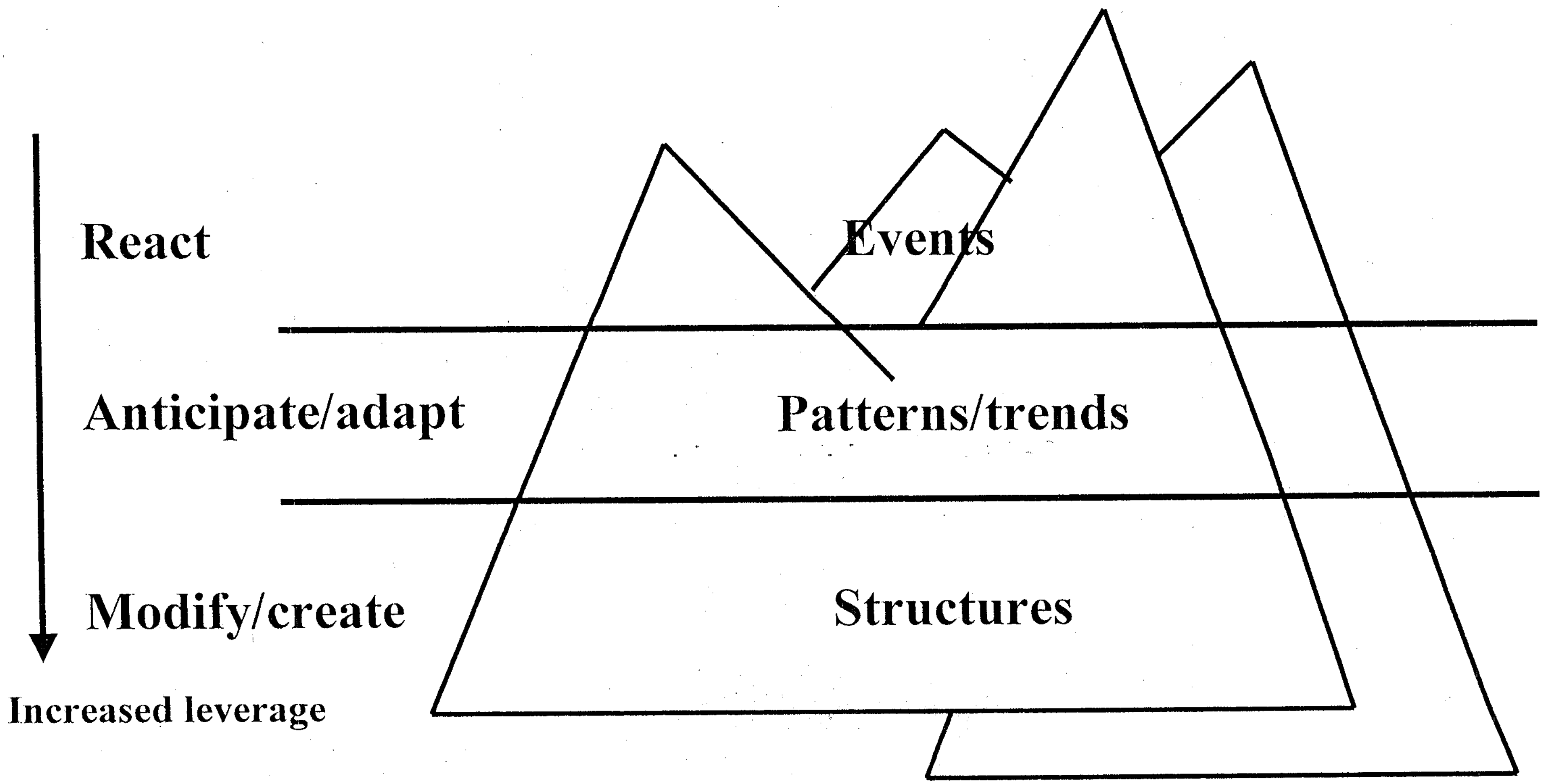
Great moments in evolution



Another great moment in evolution

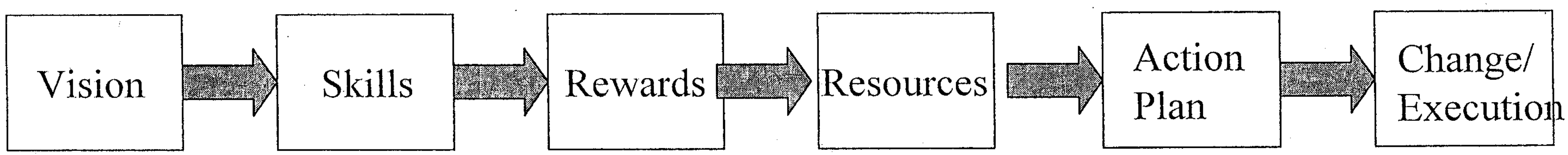
INSIGHT STRATEGIES

Events, patterns, structure…



INSIGHT STRATEGIES

Managing complex change…

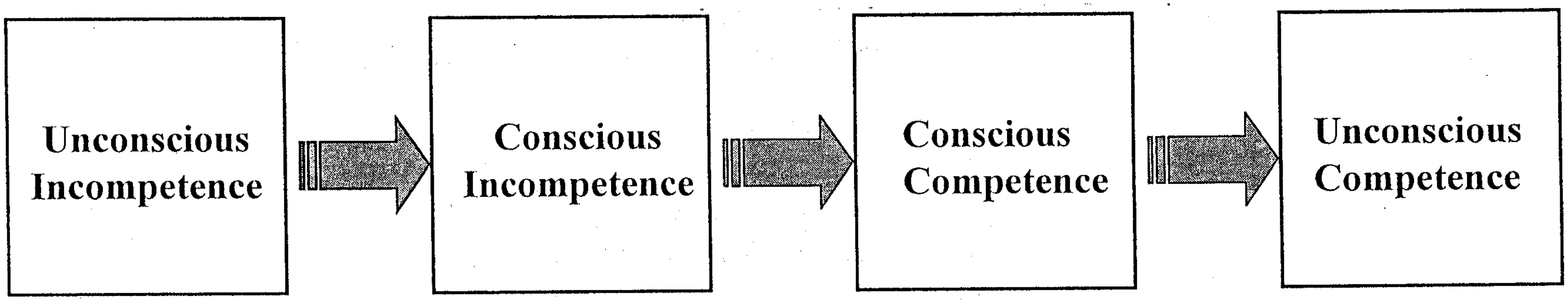


INSIGHT STRATEGIES

Managing Complex Change

Vision	Skills	Rewards	Resources	Action Plan	Change/ Execution
	Skills	Rewards	Resources	Action Plan	Confusion
Vision		Rewards	Resources	Action Plan	Anxiety
Vision	Skills		Resources	Action Plan	Gradual Change
Vision	Skills	Rewards		Action Plan	Frustration
Vision	Skills	Rewards	Resources		False Starts
	Skills				Certain Self Destruction

Training/Learning Goals…



B=f (I,E)

Behavior (B) is a function (f) of an individual (I) and the environment (E)
Kurt Lewin

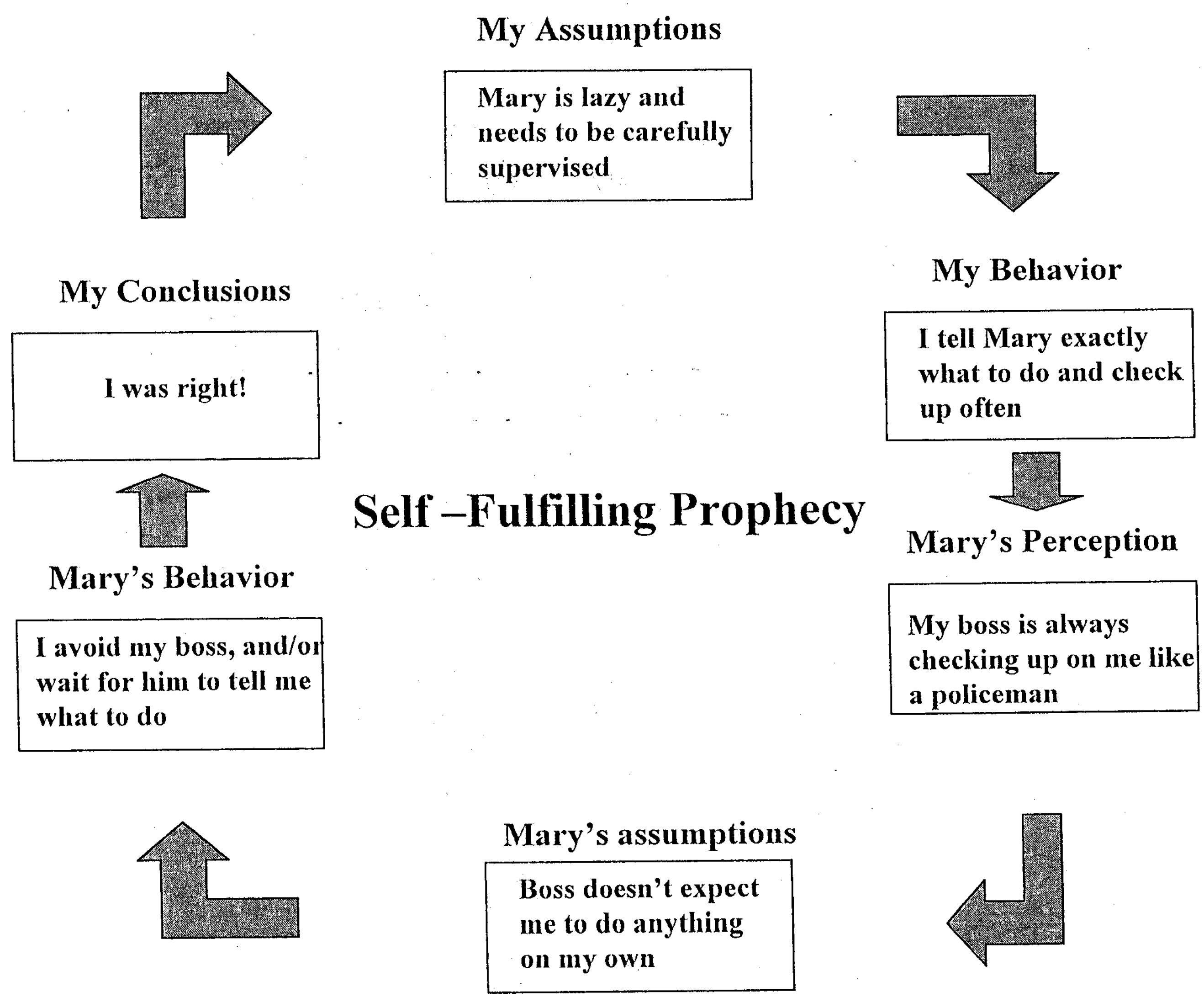
Good news/Bad news…

• ***Bad news is people are who they are when they come to us as staff…standards and values are something we can't control***

•***Good news is behavior also reflects the environment…something that we as managers <u>can</u> control***

INSIGHT STRATEGIES

Self –Fulfilling Prophecy



Recognizing diversity in in the way people think relative to the change process

Perception…*the process by which we bring information from the external environment into our personal experience, using our five senses: sight, smell, taste, hearing, touch.*

Attitudes…*the relatively fixed sets of ideas we have about what we experience, based on our internal filters-memory, emotions, feelings and needs.*

- *The cognitive component…the beliefs a person may have about a particular person place or thing*
- *The feeling component…the emotions connected to the beliefs*
- *The action tendency…behavior associated with the beliefs*

Challenges of *perception* relevant to change management…

•Perceptual distortion…*seeing "one slice of the pie"*

•Selective perception…*the filter that isolates a particular object or action from everything else competing for our attention, and rejects it if it is not relevant or important to satisfy our needs*

•Stereotyping…*filters that distort our perception of others*

•Projection…*a perceptual defense in which we relieve feelings of guilt or failure by placing blame on someone or something else*

Challenges of *attitudes* relevant to change management…

Cognitive dissonance…*the state of internal tension caused by holding two views that are inconsistent*

Because we value consistency, we either reject new information that threatens the stability of our existing value system or seek to reconcile it (often through rationalization). The state of internal tension caused by holding two views that are inconsistent is uncomfortable, and people go to great lengths to reduce it or eliminate it.

Daryl Conner in *Managing at the Speed of Change* says that it's *not* the change itself, but the *implications* of the change. When life does not match how you anticipate how it will be, the *"Beast"* takes over.

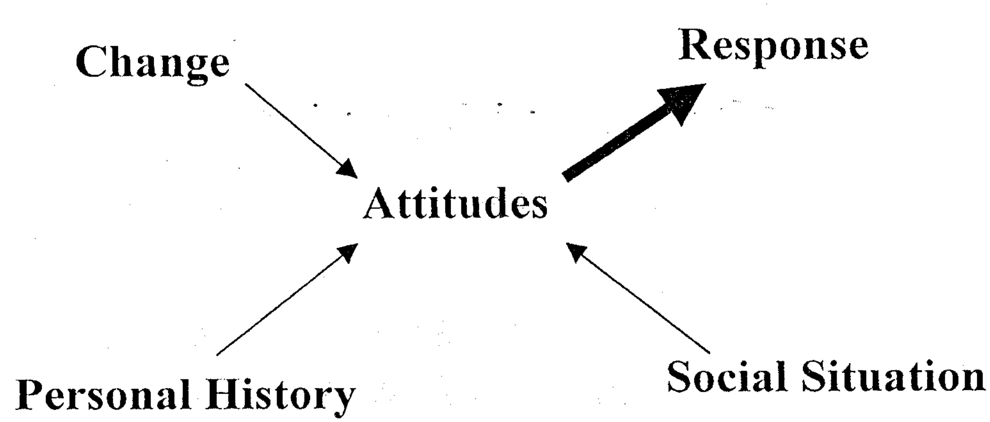
The "Beast" is the fear and anxiety within us all as we encounter the significant, unanticipated changes that shatter our expectations. The "Beast" is a metaphor, but its devastation of individuals, organizations and society is real.

Generally nobody likes change…

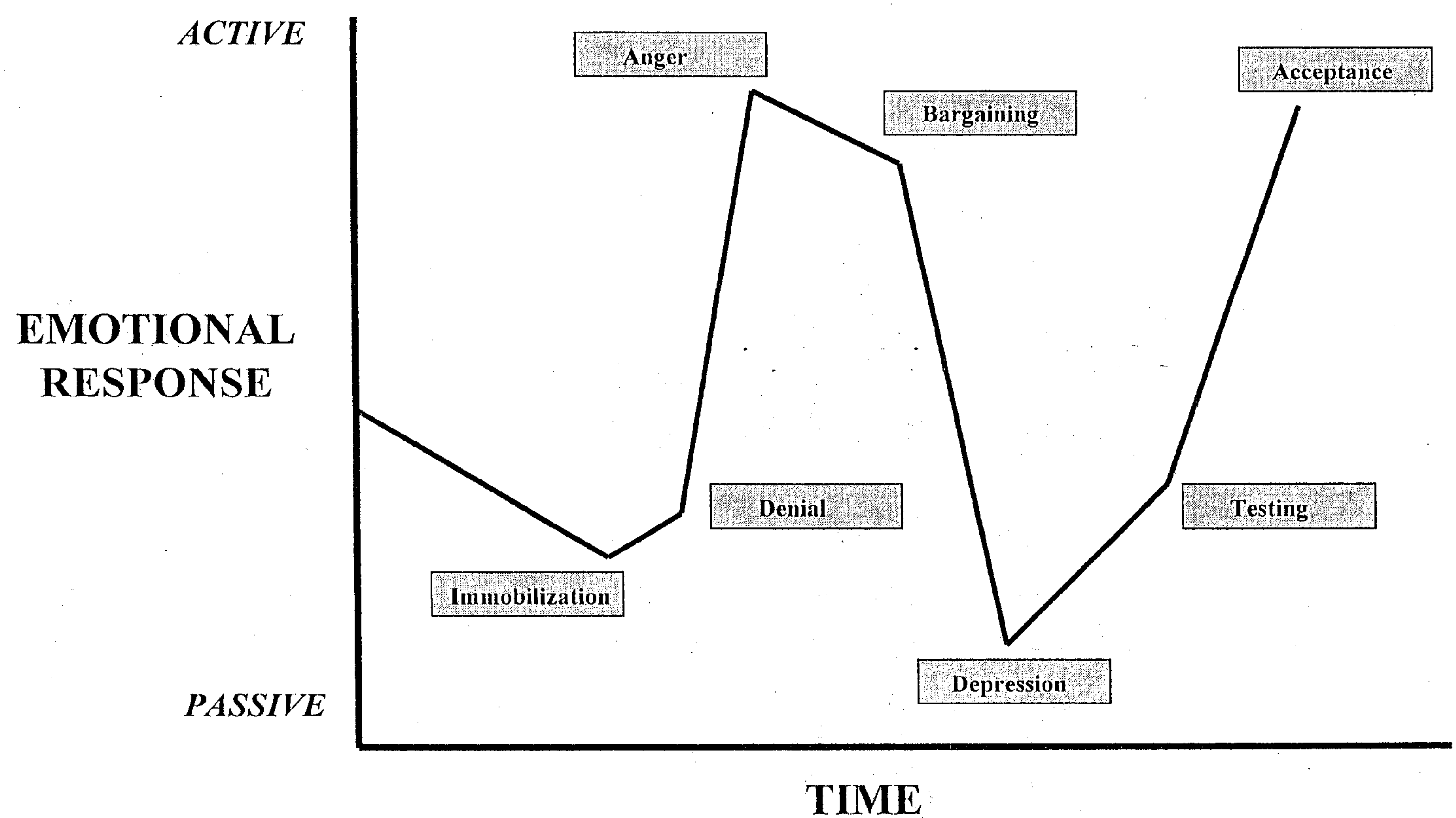
People seek stability and order. We are control oriented animals…change can mean disruption and uncertainty.

Resistance to change is usually neither blind nor irrational. Under normal conditions, people resist changes that negatively affect them and welcome changes the (they believe) positively affect them. That's rational behavior!

Each change situation is interpreted by an individual according to his or her attitudes



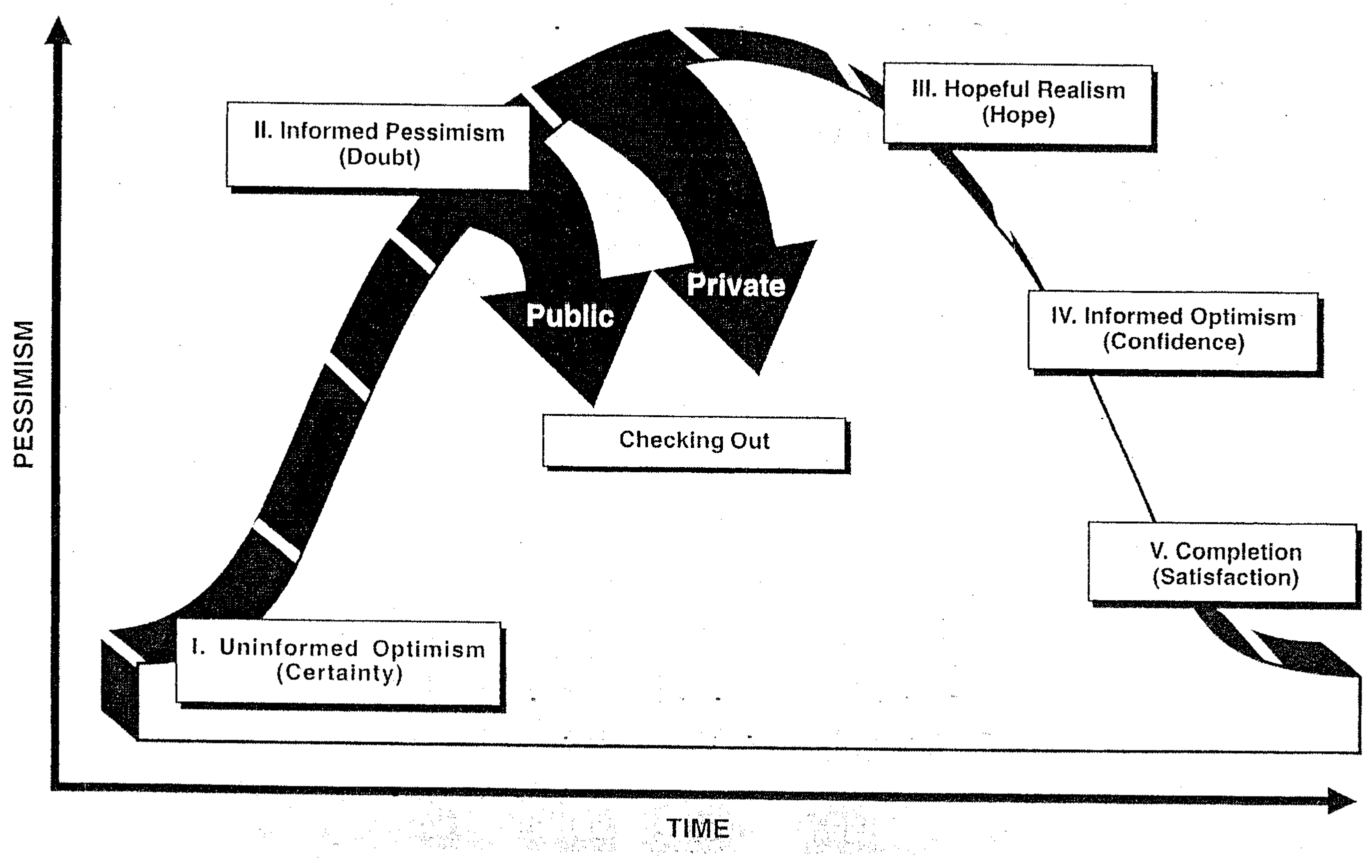
INSIGHT STRATEGIES



INSIGHT STRATEGIES

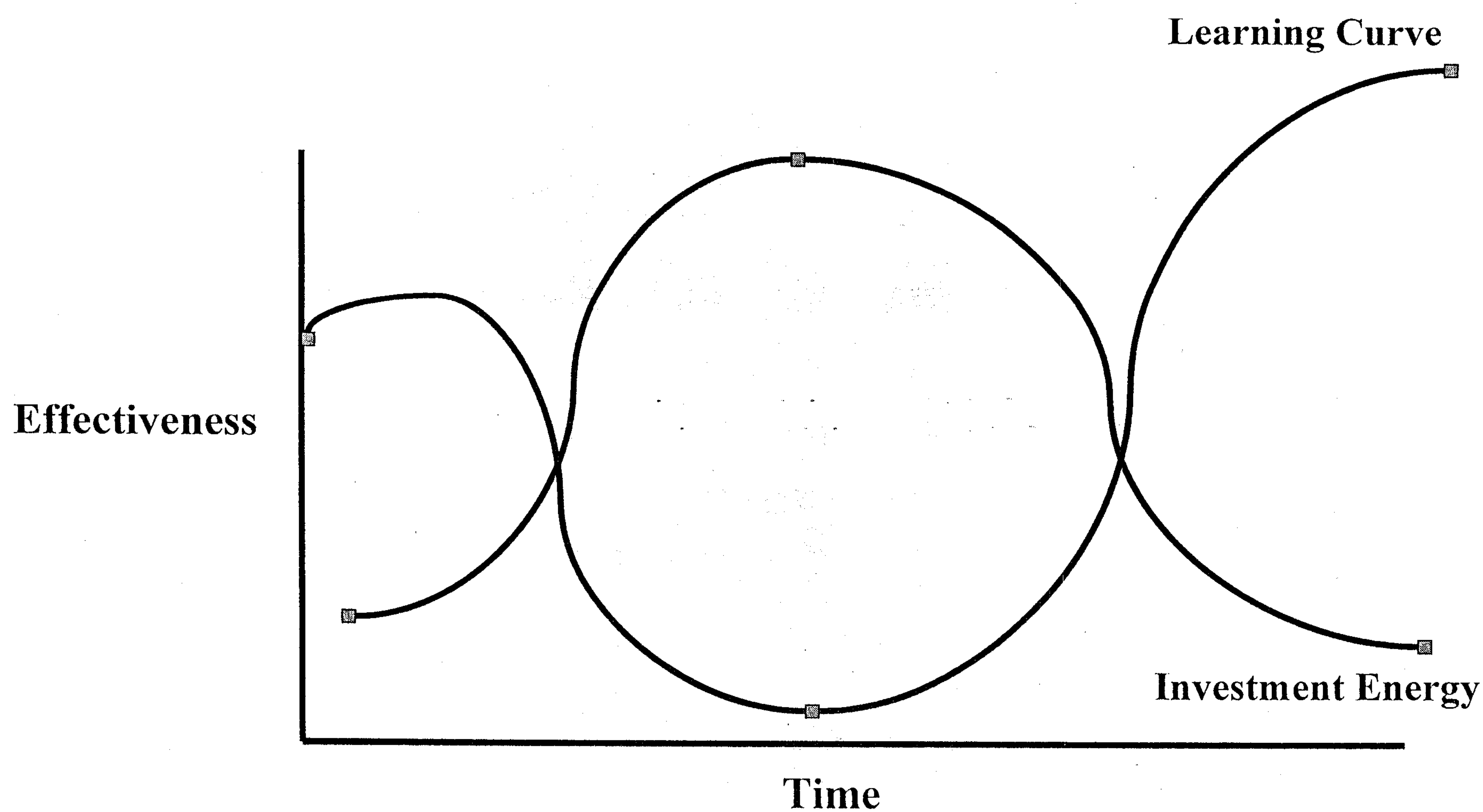
From *Managing at the Speed of Change,* Daryl Conner

EMOTIONAL RESPONSE TO POSITIVELY PERCEIVED CHANGE



From *Managing at the Speed of Change,* Daryl Conner

Learning and Energy Investment Curves



The principal factors causing resistance to change are:

- **Lack of security or status...** *A change might strike directly at security needs by putting one's job, position, or valued social relationships on the line. People generally defend their positions in organizations and resist changes that are threatening*

- **Inconvenience...** *Many changes make life more difficult-more work or disrupting comfortable patterns of acting or interacting*

- **Distrust or uncertainty...** *Changes might be questioned because the subjects of change question the motives or wisdom of those making the changes. Because there is often no way to be sure the new ways will achieve their intended results, change is often loaded with uncertainty.*

- **Cognitive Dissonance Reduction...** *New ways often disparage the old ways of doing things. "How could I have been doing it wrong all these years?"*

Techniques for reducing resistance to change…

- *Create awareness of the need for change*
- *Involve people to the maximum extent feasible in determining what the changes should be*
- *Communicate the changes – and the rationale for them – honestly and frequently*
- *Deal frankly and honestly with people's concerns*
- *Give people a role in introducing the changes*

It's about *engagement*…

INSIGHT STRATEGIES

Engagement…

- Dialogue
- Education and training
- Flexibility and patience
- Reward new behaviors
- Focus on stability

The single most important factor necessary to increase an organization's success in a major change process is the degree to which its people are *resilient.* *Daryl Conner*

***Resilient* people:**

1. **Display a sense of security and self-assurance that is based on their view of life as complex, but filled with opportunity (Positive)**
2. **Have a clear vision of what they want to achieve (Focused)**
3. **Demonstrate a special pliability when responding to uncertainty (Flexible)**
4. **Develop structured approaches to managing ambiguity (Organized)**
5. **Engage change rather than defend against it (Proactive)**

From *Managing at the Speed of Change,* Daryl Conner

5 Characteristics of Resilience

1. Positive…Views Life as Challenging, but Opportunity Filled

- Interprets the world as multifaceted and overlapping
- Expects the future to be filled with constantly shifting variables
- Views disruptions as the natural result of a changing world
- Sees life filled with more paradoxes than contradictions
- Sees major change as uncomfortable, but believes that hidden opportunities may usually exist
- Believes there are usually important lessons to be learned from challenges
- Sees life as generally rewarding

INSIGHT STRATEGIES

From *Managing at the Speed of Change,* Daryl Conner

5 Characteristics of Resilience

2. Focused…Clear Vision of What I to Be Achieved

•**Maintains a strong vision that serves both as a source of purpose and a guidance system to reestablish perspectives following significant disruption**

5 Characteristics of Resilience

4. Organized…Applies Structures to Help Manage Ambiguity

- Identifies the underlying themes embedded in confusing situations
- Consolidates what appears to be several unrelated change projects into a single effort with a central theme
- Sets, and when necessary, renegotiates priorities during change
- Manages many simultaneous tasks and demands sucessfully
- Compartmentalizes stress in one area so that it does not carry over to other projects or parts of one's life
- Recognizes when to ask others for help
- Engages major action only after careful planning

From *Managing at the Speed of Change,* Daryl Conner

5 Characteristics of Resilience

5. Proactive…Engages change Instead of Evading it

- Determines when a change is inevitable, necessary, or advantageous
- Uses resources to creatively reframe a changing situation, improvise new approaches, and maneuver to gain an advantage
- Takes calculated risks despite potentially negative consequences
- Draws important lessons from change-related experiences that are then applied to similar situations
- Responds to disruption by investing energy in problem solving and teamwork
- Influences others and resolves conflicts

From *Managing at the Speed of Change,* Daryl Conner

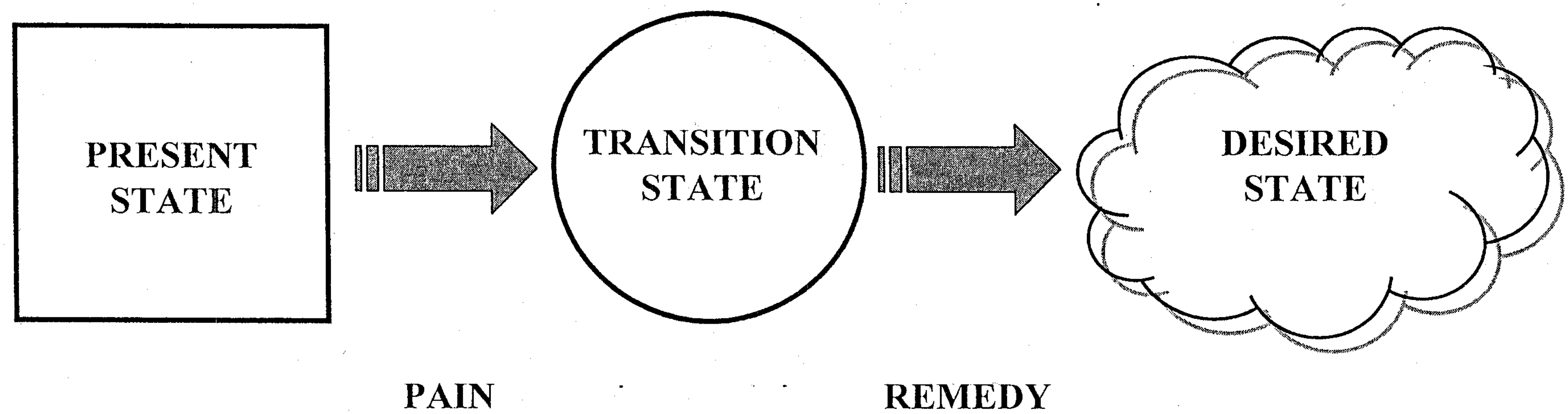
Change Process

Kurt Lewin described the process of change as going from one steady state to another

Unfreeze	→	Introduce change	→	Refreeze
Prepare the group to accept change…create a sense of dissatisfaction with the status quo…a "burning platform"		***The specific changes introduced must be understood and accepted***		***Once new behaviors have been internalized, create an environment that constantly reinforces the desired change***

Change Process

Daryl Conner has another view of change as a process



INSIGHT STRATEGIES

From *Managing at the Speed of Change*, Daryl Conner

Assimilation…

The process we use to adjust to the positive or negative implication in a major shift in our expectations. Assimilation consumes energy, and everyone has an "assimilation capacity".

Imagine a sponge and the limits it has in absorbing water…

From *Managing at the Speed of Change,* Daryl Conner

Critical Roles in Change

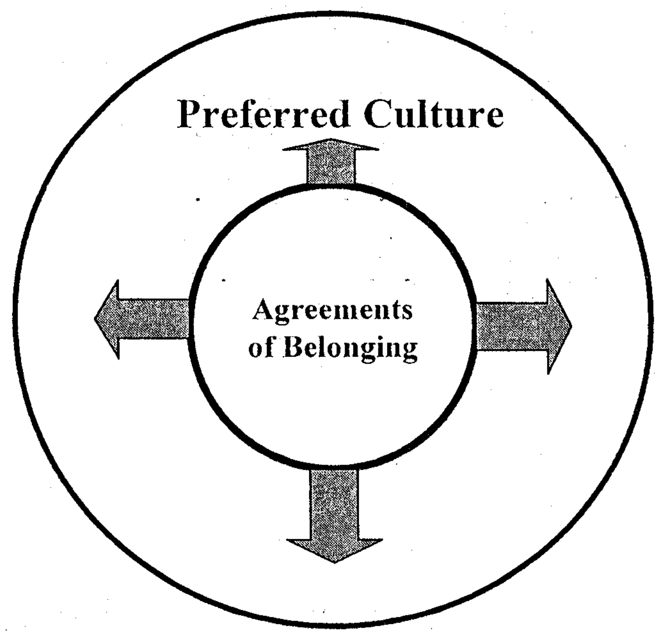
- **Sponsors…***individual or group who who has the power to sanction or legitimize change*
- **Agents…***individual or group who is responsible for actually making the change*
- **Targets…***individual or group who must actually change*
- **Advocates…***individual or group who wants to achieve a change, but lacks the power to sanction it*

INSIGHT STRATEGIES

From *Managing at the Speed of Change,* Daryl Conner

Agreements of Belonging and the Preferred Culture

The Agreements of Belonging represent a statement of commitment to a set of behaviors that relate explicitly to the team. They also are a *subset* of the organization's broader *preferred culture*. Behaviors on the part of the team consistent with the AOB will model and support the longer-term organizational preferred culture.



Agreements of Belonging

Beliefs

What fundamental beliefs are core to supporting our preferred culture and business strategies? (Growing organizational capacity *and* addressing the business imperatives.)

How do these beliefs facilitate our *intentional* participation in the organization

Agreements

What are the implicit and explicit agreements?

How does the organization support or compromise these beliefs?

Accountability

What behaviors and actions support the agreements?

What are the obvious/hidden incentives/disincentives

Do we have realistic expectations of each other?

How do we deal with people who are chronic poor performers or people who are pathologically perfectionist?

Agreements of Belonging

Through these Agreements of Belonging, we choose to be members of the ABC leadership team. We will hold each other accountable for the following beliefs, agreements and actions as part of "volunteering" to be an engaged team member.

BELIEF STATEMENT:

We believe that patient care comes first.

AGREEMENTS:

- We agree that all decisions should support the quality and the delivery of patient care services.
- We agree that the organizational structure should be designed to facilitate effective, high-quality patient care.

ACCOUNTABILITY ACTIONS:

- At our individual and departmental level of influence, we will continually examine whether our services are facilitating optimal patient care.
- We will have a high degree of sensitivity toward the organization's caregivers, i.e., their needing to deal with a family that has experienced a loss, interruptions that occur at meetings due to patient care issues, etc.

BELIEF STATEMENT:

We believe that our interactions should be respectful, productive, efficient and effective.

AGREEMENTS:

- We agree that high-quality communication is the key ingredient for a successful organization.
- We agree to adhere to the confidentiality of conversations.

ACCOUNTABILITY ACTIONS:

- We will clarify roles at the beginning and end of each meeting/work session/project (responsibility charting).
- We will use consensus in resolving differences.
- We will ensure that agendas will be related to the organization's stated priorities.
- We will be prepared for every meeting.
- We will utilize all available technology to share information.
- We will begin and end meetings on time.
- We will not discuss anything outside of the meetings that the group determines confidential.

ST. JOSEPH MERCY HOSPITAL
Ann Arbor, Michigan

MEDICAL STAFF POLICY

Revised
Number: 4-4.7

SUBJECT: **ADMISSION, CONSULTATION, AND TRANSFER IN SJMH-AA INTENSIVE CARE UNITS**

EFFECTIVE DATE: 10/14/03
REVISED:

NOTE: The following language represents consolidation of MSP 4-4.7 and MSP 4-4.2.

◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆

NOTE: **PURPOSE** and **BACKGROUND** from MSP 4-4.2 are **not** included; were **not** moved to be incorporated into the combined policy.

This policy applies to the SJMH NICU, MICU, SICU, and CCU. The policy does not apply to step down units. This policy does not apply to patients at SJM-LH or SJM-SH.

Admitting ICU Physician:

- Physicians who admit patients to a SJMH Intensive Care Unit must meet criteria in Table A. Privileging criteria for the ICU will be brought in conformance with this requirement.

- If a physician wishes to have his/her patient transferred to an SJMH intensive care unit and the physician does not meet criteria in Table A, primary responsibility for care of the patient must be transferred to a physician who meets criteria in Table A. Responsibility for inpatient care will be returned to the initial physician when the patient is discharged from the ICU, unless the initial physician does not want the patient returned to his/her care.

~~**Consultation and Support**~~

Clinical Care:

A. ***In accordance with department polices, and Rules and Regulations, physicians with appropriate delineation of privileges may admit patients to the MICU, CCU, and SICU.***
   ➔ *(Language taken from proposed revisions to MSP 4-4.2)*

B. Family practice physicians ***and other attendings who do not have house officer coverage*** must transfer their patients to the ~~Critical~~ ***Intensive*** Care Unit attending on admission of patients, since patients in the ~~Critical~~ ***Intensive*** Care Unit are cared for by Internal Medicine House officers. ***All patients in MICU and CCU must have house officer coverage.***
   ➔ *(Language from MSP 4-4.2, Item B. under POLICY, with revision to first sentence and **addition** of last sentence).*

C. All adult patients transferred who do not have an intensivist as an attending physician and who remain in the ICU for more than 24 hours, will be co-managed by an intensivist who will see the patient in consultation.[1] The only exception is patients admitted to the CCU by a cardiologist. (6/18/03: Note that this provision will be implemented in the SICU when appropriate intensivist coverage can be arranged.)

➔ *(Moved from first dot point under "Consultation and Support" in current MSP 4-4.7)*

D. ***In accordance with department policies, procedures, and regulations, all physicians should obtain specialty consultation when appropriate and deemed necessary.***

➔ *(Language moved from proposed revision to MSP 4-4.2, item C.)*

E. The Medical Director of ~~a Critical~~ ***an Intensive*** Care Unit has authority to require consultation when he or she deems it appropriate for patient care.

➔ *(Language moved from MSP 4-4.1, item D.)*

F. ***All attendings must take the FCCS course and pass the certification exam to admit to the MICU and CCU.*** FCCS-trained residents and other providers (operating under the supervision of the attending physician and consulting intensivists) will be available to the MICU, CCU and SICU within five minutes to respond to clinical exigencies.

➔ *(Moved from second dot point under "Consultation and Support" in current MSP 4-4.7 with **addition** of the first sentence.)*

G. All physicians who provide primary or consultative care for intensive care unit patients will adhere to all ICU protocols, must work in a positive manner with all staff, and be available on site as necessary to take care of patients in the intensive care unit.

➔ *(Moved from 3rd dot point under "Admitting ICU Physician" in current MSP 4-4.7)*

~~Administration of ICUs~~

ICU Administration:

- NICU, SICU, CCU, and MICU will continue to have separate medical directors. For the adult units, a single set of policies will be used, which will be developed and approved by the three medical directors.

- The medical director of each unit will assume primary responsibility for insuring that all patients who can be safely discharged from the unit are discharged. The SICU director will oversee the timely discharge of patients in the SICU, regardless of the service from which the patient was originally admitted. The same principal applies to the CCU director and the MICU director. This responsibility for insuring that patients are discharged in a timely manner requires that ICU directors actively work with attending physicians, and may involve consultation with other ICU directors if a patient is from a service outside the medical director's clinical specialty. Responsibility for clinical decision making lies with the attending physician and the clinical Department of which he/she is a member.

[1] Co-management by an intensivist is required to meet Leapfrog standards.

- When a medical director of an ICU is away from work due to meeting, illness, or vacations the director will arrange to have an intensivist provide coverage in his or her absence (MICU and SICU) or a cardiologist (CCU) or neonatologist (NICU). SICU and MICU medical directors will comply with Leapfrog availability standards or obtain coverage from an intensivist who will comply with standards.

= =

Cross Reference: Medical Staff Policy 4-4.8, "Management of Patients on Assisted Ventilation"

MSP 4-4.7
(P4-4-7-COS)

Reference: ICU Medical Directors, Internal Medicine Department Chair, Surgery Department Chair, ***Critical Care Committee***

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TABLE A

Physicians who may be privileged to admit to a SJMH-AA Intensive Care Unit

NICU

Board- certified or eligible neonatologists

CCU, MICU, and SICU

Board- certified or eligible intensivists/critical care specialists

OR

Board- certified or eligible surgeons in any of the following specialties:
- cardiac and thoracic
- general surgery
- vascular surgery
- neurosurgery

OR

Board- certified or eligible cardiologist

OR

Board- certified or eligible internist who is FCCS certified by January 1, 2004[2]

MSP 4-4.7
(P4-4-7-COS)

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[2] The deadline for FCCS certification will be extended for individuals who are unable to enroll in a local FCCS certification course, due to unavailability of free space.

ST. JOSEPH MERCY HOSPITAL
Ann Arbor, Michigan

MEDICAL STAFF POLICY Number: **4-4.1**

SUBJECT: **ADMISSION AND DISCHARGE CRITERIA FOR INTENSIVE CARE UNITS**

EFFECTIVE DATE: 9/14/87
REVISED: 6/12/95, 1/8/96, 9/29/98, 8/14/2001, 6/8/2004

The following guidelines are to be employed when considering admission and discharge/transfer of patients to the Medical Intensive Care Unit, the Surgical Intensive Care Unit, and the Coronary Care Unit. Patients may meet one or all of the criteria used to describe patient condition.

All patient care orders must be reviewed/rewritten upon admission to or transfer from the Critical Care Units. It will not be necessary to review/rewrite orders when patients are transferred among Critical Care Units as long as they remain under the care of the same service.

CRITICAL CARE ADMISSION CRITERIA

A. Patient requires one or more of the following treatment/monitoring modalities:

1. Acute need for mechanical ventilation r/t deteriorating respiratory status
2. Endotracheal intubation with aggressive airway management
3. Hemodynamic monitoring ie: pulmonary artery catheter
4. Continuous renal replacement therapy
5. Titration of vasoactive medications every 30 minutes or greater
6. Intra-aortic balloon pump
7. Ventricular assist device
8. Intracranial pressure monitoring
9. Gastrointestinal tamponade e.g. Minnesota tubes
10. Administration of thrombolytic therapy for acute MI and stroke
11. Frequent medication administration and/or laboratory monitoring with aggressive intervention every 1 hour or more

B. Hemodynamically unstable patients requiring management:

1. Requiring fluid resuscitation or vasopressors to maintain systolic BP > 80 mm Hg
2. Requiring countershock or intravenous antiarrythmic for refractory/intractable VT or VF
3. Administration of multiple blood products to maintain hemodynamic or hemopoietic stability
4. Requiring aggressive diuretic or vasoactive management for hemodynamic compromise
5. Low cardiac output with diminished organ perfusion requiring intervention
6. Immediately post cardiopulmonary resuscitation

7. Hypothermic patient requiring warmed fluids and monitoring

C. **Respiratory instability:**

1. Impending respiratory failure as evidenced by increased respiratory effort, deteriorating respiratory parameters, oxygenation status, decreased ability to eliminate secretions and/or decreased ability of patient to tolerate independent ventilation.
2. Increasing frequency of respiratory monitoring, i.e., pulse oximetry, blood gas determination, and O_2 titration greater than every 30 minutes for 2 hours.

D. **Neurologic instability**:

1. Actual/potential deterioration in level of consciousness as a result of :
   a. Drug overdose
   b. Subarachnoid hemorrhage
   c. Herniation
   d. Stroke in evolution
   e. Metabolic imbalance
   f. Hypertensive crisis
   g. Craniotomy
   h. Trauma
   i. Status epilepticus
   j. Meningitis and other infectious CNS complications
2. Unstable Glasgow Coma Scale requiring frequent neurologic assessment
3. Frequency of neurological assessments and/or interventions greater than every 1 hour

E. **Cardiovascular instability:**

1. Requiring thrombolytic therapy or emergent PCI for myocardial ischemia/infarction
2. Requiring frequent titration of intravenous antiarrhythmics for unstable cardiac rhythms resulting in hemodynamic compromise.

F. **Seriously injured trauma patients with unstable hemodynamic, respiratory, and/or neuro status. Surgical Intensive Care Unit according to Level II Trauma Certification.**

1. Penetrating injuries to the head, chest, abdomen, or pelvis
2. Spinal cord injury
3. Pelvic fracture
4. Blunt head injury with Glascow Coma Scale (GCS) < 13, or changing GCS, or head injury requiring ICP monitoring

G. **Patient coming from the operating room to CCU and MICU must be recovered in PACU except for tracheostomies.**

<u>ADMISSION PROCESS</u>

1. Attending physician, Emergency Department physician, or designee evaluates patient condition to determine appropriate placement for inpatient admission ,e.g patient meets criteria for critical care unit admission.

2. Attending physician, Emergency Department physician, or designee contacts Patient Resource Manager to arrange placement in the appropriate critical care unit based on acute medical or surgical diagnosis or as an accommodation in a different critical care unit.(per Medical Staff Policy 4-4.3 Assignment of patients within the critical care program when census exceeds standard operating capacities.)

3. Collaborates with Nurse Coordinator, Shift Coordinator, or Clinical Nurse Manager-to arrange appropriate patient placement based on availability of both beds and appropriate nursing staff.

4. Patients admitted to the critical care units are managed by designated House Staff.

5. Attending physician retains accountability for own patients.

6. The Medical Director of each respective critical care unit shall provide advice, consultation, assistance and recommendations with respect to utilization of critical care beds, including recommended triaging to other appropriate units, and admissions, transfers, and discharges during emergency bed utilization circumstances, such as high census and disasters.

TRANSFER OR DISCHARGE CRITERIA

A. Patient no longer requires one or more of the treatment/monitoring modalities:

1. Mechanical ventilation or endotracheal intubation unless transferring to 4100.
2. Invasive monitoring: pulmonary artery catheter, intracranial pressure monitoring
3. Intra-aortic balloon pump
4. Continuous renal replacement therapy, left ventricular assist device, or gastrointestinal tamponade

B. Hemodynamically stable:

1. Systolic BP > 80 mm HG or baseline pressure stable 2. Stabilization of life threatening dysrhythmia
3. Absence of hypoxemia, impaired airway, or significant respiratory compromise
4. Stabilization of hemodynamic or hemopoietic status without use of vasoactive therapy
5. Resolution of hypothermia

C. No longer requiring every 30 minute medical or nursing intervention, e.g., blood draws or frequent titration of vasoactive drugs.

MEDICAL MANAGEMENT

1. The medical management of the critical care unit will be directed by the Medical Director of the ICU. The chairman of the respective department appoints this position.

2. The Medical Director will be responsible and accountable for the quality of medical care administered to the patients within their respective ICU.

3. The attending physician retains primary responsibility for the care of the patient in the critical care unit. It is expected that the attending physician will work with the House Officer and nursing staff during the patient's treatment.

4. The House Staff or Physician Assistants under the direction of Attending Physician are responsible for coordinating patient care and informing the Attending Staff Physician of any major changes in therapy or patient condition. The House Staff and/or PA's are responsible for writing orders for patients while in ICU.

5. The Attending Physician shall directly supervise resident physicians assigned to the unit for patient care, education and research projects.

6. The Attending Physician will round/see the patient at least every 24 hours with daily documentation in the progress notes addressing the patient's status.

7. The Attending Physician in MICU must meet the criteria outlined in MSP 4.4-7.

Cross Reference: MSP 4-1.6. Care and Placement of Pediatric Patients and Guidelines for Transfer of Pediatric Patients from St. Joseph Mercy Hospital to a Pediatric Tertiary Care Center

MSP 4-4.1
(P4-4-1-COS)

Reference: ICU Medical Directors
Reviewed: 1991 (E.C. 2/92); 6/95 (revised); 10/95 (revised); 1/96 (revised); 9/98 (revised), 8/01 (minor revisions); 6/04 (revised)

ST. JOSEPH MERCY HOSPITAL
Ann Arbor, Michigan

MEDICAL STAFF POLICY Number: 4-4.4

SUBJECT: **PATIENT ADMISSION, TRANSFER, AND DISCHARGE GUIDELINES FOR THE PROGRESSIVE CARE UNITS (2000, 2100, 4100, and 6000A)**

EFFECTIVE DATE: 12/17/96
REVISED: 10/27/98, 8/14/2001, 4/20/2004

PURPOSE:

The purpose of this policy is to guide the placement of patients in the appropriate environment. Differentiation between the requirement for intensive care and progressive care is based upon this policy and dialogue between medical and nursing staff requiring patient care requirements.

The purpose of the Progressive Care Units is to provide individualized care to patients who require closer observation and monitoring of unstable and/or compromised conditions. These units provides a level of care which is less than that provided in the intensive care units, but of greater intensity of care than that provided by the general units.

Scope of Unit Practice:

2000: The 2000 Unit provides services older adolescent, adult, and older adult cardiac patients as well as medical patients who require cardiac monitoring.

2100: The 2100 Unit provides services to adult medicine and cardiac, cardiothoracic surgery, general surgery, and surgery subspecialty patients.

4100: The 4100 Unit provides services to adults with acute and chronic diagnoses. Pulmonary disease, renal disease, diabetes, chemical dependency, complex family and/or Psychosocial issues, and multi-system organ diseases are commonly seen.

6000A The 6000A Unit provides services to adult cardiac medicine patients including stable MI's, post intervention, arrhythmias, CHF, and pacemakers. Patient must have a cardiologist for the admitting physician.

POLICY:

I. **Admission Criteria**:

A. General Admission Criteria: Patients that will be considered as candidates for admission to these units include:
1. ICU transfers
2. ED admissions
3. Direct admissions,, i.e. transfers from other hospitals or ED's or physician offices.
4. Transfers from the general units.

B. Patient determined by assessment to require frequent and/or complex medical and nursing interventions and/or observations (i.e., vital signs, I&O, dressing changes, respiratory care) as compared to care delivered on general units.

C. Cardiac System
   1. Definite Acute Coronary Syndrome patients [NonSTElevation Myocardial Infarction (NSTEMI) or Unstable angina]
   2. Hemodynamically stable Acute STEMI patients
   3. Any hemodynamically stable dysrhythmia
   4. Any hemodyamically stable patient requiring temporary (excluding 4100) or permanent pacemaker
   5. Mild to moderate heart failure without shock
   6. Hypertensive emergency without evidence of end-organ damage or without requirements for Nipride
   7. Post cardiac intervention, e.g., placement of ICD, Percutaneous Coronary Intervention (excluding 4100)
   8. Patients who are undergoing cardiac drug administration that requires more frequent observation/ assessment and/or cardiac monitoring

D. Pulmonary System
   1. Hemodynamically stable patients with evidence of compromised gas exchange and underlying disease with the potential for worsening respiratory insufficiency who require frequent observation and/or continuous positive airway pressure.
   2. Patients who are unstable on current oxygen therapy (i.e., desaturates easily on oxygen therapy with little or no activity).
   3. Patients who have been extubated but still require aggressive pulmonary physiotherapy, or who require frequent tracheal suctioning via a tracheostomy, endotracheal tube and/or nasotracheal suctioning due to a weakened cough, copious secretions, decreased LOC, poor gag reflex, etc., in order to maintain a patent airway.
   4. On the 4100 Progressive Care Unit:
      Patients requiring mechanical ventilation who meet the following criteria:
      - transfer from one of the SJMH ICUs with transfer approved by one of the pulmonologists
      - hemodynamic stability
      - maximum of two organ system acute failure (including respiratory system)
      - meets all other progressive care admission criteria
      - MICU covered
      - May require reinitiation of mechanical ventilation but are otherwise stable

E. Neurologic Disorders
   1. Patients with established, stable stroke who require frequent neurologic assessments, suctioning, or turning.
   2. Stable severe traumatic brain injury patients who require frequent positioning and pulmonary hygiene.
   3. Acute neuromuscular disorders, including Guillian Barre Syndrome, without evidence of rapid decline or respiratory failure.
   4. Patients with chronic but stable neurologic disorders, such as neuromuscular disorders, who require frequent nursing intervention.

<u>2100 Progressive Care Unit as target unit:</u>

- Acute traumatic brain injury patients who have a Glasgow Coma Scale above 9 but require frequent monitoring for signs of neurologic deterioration.
- Subarachnoid hemorrhage patients post-aneurysm clipping who require observation for signs of vasospasm or hydrocephalus.
- Stable neurosurgical patients who require a lumbar drain for treatment of cerebrospinal fluid leak.
- Stable cervical spinal cord injured patients.

F. Drug Ingestion and Drug Overdose

1. Any patient requiring frequent neurologic, pulmonary, or cardiac monitoring for a drug ingestion or overdose who is hemodynamically stable.

G. Gastrointestinal (GI) Disorders

1. GI bleeding with minimal orthostatic hypotension responsive to fluid therapy.
2. Variceal bleeding with stable vital signs.
3. Acute liver failure with stable vital signs.
4. Acute pancreatitis with stable vital signs.

H. Endocrine

1. Patients with diabetes who do not exhibit hemodynamic instability, impaired consciousness, or severe acidosis, and who require:
   a. Continuous intravenous insulin infusion or
   b. Monitoring as frequently as q 2 hours or more frequently.
2. Hyperosmolar state with resolution of coma.
3. Thyrotoxicosis, hypothyroid state requiring frequent monitoring.

I. Surgical

1. The postoperative patient, who, following major surgery, is hemodynamically stable but may require fluid resuscitation and transfusion due to major fluid shifts.
2. The postoperative patient who requires close nurse monitoring during the first 24 hours. Examples include but are not limited to carotid endarterectomy; peripheral vascular reconstruction, the neurosurgical patients requiring frequent neurosurgical exams.

J. Sepsis

1. Appropriately treated and resolving early sepsis without evidence of shock or secondary organ failure.

K. Hypotensive patients who require Dopamine therapy in which a constant rate can be attained and maintained. In general, titration would be the exception.

II. Patients Considered INELIGIBLE for Admission to Progressive Care Include:

A. Patients who require invasive monitoring other than arterial pressure monitoring or central venous pressure (CVP). (Arterial lines only on 2100.)

B. Complicated acute myocardial infarction with hemodynamic instability, significant pulmonary edema or significant ventricular dysrhythmias.

C. Patients with acute respiratory failure requiring intubation .

D. Patients in status epilepticus.

E. Clinically unstable patients who require intravenous drug administration to maintain or improve hemodynamic or rhythm stability, e.g. patients that require frequent (every 15 minutes) monitoring or who require frequent monitoring of respiratory and neurological status related to intravenous medications:

1. Phenylephrine (Neosynephrine)
2. Epinephrine
3. Vasopressin (Pitressin)
4. Drotrecogin Alfa (Xigris)
5. Nitroprusside
6. Norepinephrine (Levophed)
7. Propofol (Diprivan)
8. Continuous infusion of sedative drugs (Midazolam, Lorazepam) (Exception: Patients who are DNR.)
9. Neuromuscular blocking agents (Cisatracurium, Pancuronium)

Nesiritide is not to be administered on 4100; Dofetilide is not to be <u>initiated</u> on 4100.

F. Clinically unstable patients who require a frequency of assessment and intervention every 15-20 minutes or greater for a period longer than 2 hours, e.g. not related to standards of care post invasive or non-invasive procedure.

G. Patients coming directly from the Operating Room; they must be recovered in the PACU.

III. Transfers:

A. Patients will remain on the Progressive Care Unit until discharge whenever possible. Patients no longer requiring intensity of care or rhythm monitoring may be transferred to a general patient care unit. Transfer only with physician order.

B. Patients will be transferred from the unit when they no longer meet the criteria for PCU care outlined in this policy (excluding cardiothoracic surgery and cardiology patients).

C. The transfer of a patient to and from the Progressive Care Unit is accomplished only on the order of a physician.

IV. Medical Staff:

A. The attending physician must be notified of the patient's condition by the appropriate house officer or nurse prior to admission to or transfer from the Progressive Care Unit.

B. The attending physician or house officer is responsible for notifying the patient's family if the patient requires transfer to an intensive care unit. Notification of transfer from the Progressive Care Unit to a GMB or general surgery unit will be done by staff on the transferring unit.

C. All patient care orders must be reviewed upon admission to or transfer from the Progressive Care Unit.

Reference: MSP 4-1.6. Care and Placement of Pediatric Patients and Guidelines for Transfer of Pediatric Patients from St. Joseph Mercy Hospital to a Pediatric Tertiary Care Center

Estrada, CA, et al. 2000. Evaluation of Guidelines for the Use of Telemetry in the Non-Intensive-Care Setting. Journal of General Internal Medicine. 15. 51-55.
Jaffe. AS. et al. 1991 Recommended Guidelines for In-Hospital Cardiac Monitoring of Adults for Detection of Arrhythmia.. Journal of American College of Cardiology. 18(6). 1431-3.
Nasraway, SA, et al. 1998 Guidelines on Admission and Discharge for Adult Intermediate Care Units.. Critical Care Medicine. 26(3). 607-610.

ADDENDUM

UNIT(S) in which SPECIFIC MEDICATIONS/PROCEDURES ARE PERFORMED

	Ventilators	Arterial lines	PCI / sheath removal	Temp Pacers	Newly implanted ICD	Pericardial catheter	Throbolytic therapy, peripheral vascular disease	Natrecor	Dofetilide
2000			*	*	*	*		*	*
2100		*	*	*	*	*	*	*	*
4100	*								
6000A			*	*	*	*		*	*

MSP 4-4.4
(P4-4-4-COS)

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Reference: Critical Care Committee (Gregory Neagos, MD and Denise Harrison, RN, Co-Chairs)
Reviewed: 10/98 (revised; 8/01 (minor revision); 4/2004 (revised)

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Establishing Priorities with Green Building

IT IS RARELY POSSIBLE TO DO everything we would like to reduce the environmental impact of building projects. It takes time to research alternative design and construction systems; new materials may not have proven track records; higher costs may be an impediment; or clients simply might not be interested. Therefore, it makes sense to figure out where our efforts will do the most good. Where should we focus most of our attention in designing and building structures that will have minimum impact on the environment?

Some designers and builders who emphasize sustainability have picked out just one aspect of green design—often it's recycled-content building materials—and hold that up as their flag. Material selection is one of the most visible green building strategies and often the easiest to point to—but it is usually not the most important. Deciding which measures are most important is no simple task. Here we take a look at some of the factors to consider and suggest a listing of priorities in green design. This sort of list can never be considered final—we look forward to an ongoing discussion of priorities from which we might all learn.

Finding a Basis for Establishing Priorities

Several related factors should be considered in making objective decisions about where our investments of time and money will do the most good in reducing environmental impact. First, we need an understanding of what the most significant environmental risks are. These may be global in nature, or more specific to your particular region or site. Prioritizing these risks is difficult because often they occur in unrelated fields, with no way to make direct comparisons. Which is worse: the release of toxic waste, destruction of an endangered species' habitat, or stratospheric ozone depletion? Interestingly, scientists often come up with very different priority rankings than the general public on these issues (see box).

The second critical factor is an understanding of how our buildings contribute to these risks, and how significantly the measures we adopt can help the situation. We may decide, for example, that ozone depletion, a global problem, is more important than the survival of a particular bird species. But if a building project we're working on could eliminate the last remaining habitat of that species—a major contribution to its demise—that's probably a higher priority than reducing our use of HCFCs, which are contributing incrementally to ozone layer damage.

The third factor has to do with the specific opportunities presented by each individual project. On some projects one can dramatically affect a building's performance in one particular area with very little investment, while addressing other impacts might prove very expensive and only minimally effective. Energy performance, for example, can sometimes be improved by simply adjusting a building's orientation, while using a recycled-content floor tile might increase cost significantly for relatively little gain.

Finally, we have to consider the available resources and agenda of the client. There are often measures that can be taken at no additional cost—some may even save money—to reduce environmental impacts. Implementing such measures should be a "no-brainer." Other measures might increase the first cost of a building but save money over time. How far we can go with such measures, in length of payback and size of initial investment, depends a great deal on the resources and willingness of the client. In some cases, a third party can be found to finance such measures and share in their savings. There are also measures that are

Environmental Risks as Ranked by Scientists

In 1990, scientists in the Ecology and Welfare Subcommittee of the U.S. Environmental Protection Agency's Science Advisory Board came up with this ranking of environmental issues, "despite gaps in the relevant data." The order of the environmental issues within each heading is not meant to imply a ranking.

Relatively High-Risk Problems	Relatively Medium-Risk Problems	Relatively Low-Risk Problems
Habitat Alteration and Destruction	Herbicides/Pesticides	Oil Spills
Species Extinction and Overall Loss of Biodiversity	Toxics, Nutrients, Biochemical Oxygen Demand, and Turbidity in Surface Waters	Groundwater Pollution
Stratospheric Ozone Depletion	Acid Deposition	Radionuclides
Global Climate Change	Airborne Toxics	Acid Runoff to Surface Waters
		Thermal Pollution

Source: "Reducing Risk: Setting Priorities and Strategies for Environmental Protection," The Report of the Science Advisory Board Relative Risk Reduction Strategies Committee to the EPA, September 1990.

important environmentally but don't offer the building owner any direct financial reward. Pursuing these strategies depends on the client's good will, environmental commitment, and interest in some of the less tangible benefits that may result, such as good public relations.

Given all these factors to consider, deciding which environmental goals to pursue on a given project might seem overwhelming. To provide a more concrete starting point, we've come up with a list—*EBN*'s priority ranking of measures to reduce the environmental impact of buildings. Clearly the order is arguable, and for specific projects and climatic regions a different order will apply. All the measures listed below are important, and one should definitely implement any that are feasible within the constraints of a particular project.

EBN's Priority List for Sustainable Building

This list—a builder's dozen—reflects our sense of where you might look to get the most bang for your buck. Each item is followed by a few sample strategies for implementation, and a discussion of the likely cost implications.

#1. Save Energy—Design and build energy-efficient buildings.

The ongoing energy use is probably the single greatest environmental impact of a building, so designing and constructing buildings for low energy use should be our number one priority. (The more severe the climate, the more steadfast the ranking of this priority.) Decisions made during the design and construction of a building will affect the environmental performance of that building for decades to come—perhaps even centuries—through energy consumption. An integrated design approach often presents energy savings that result from interactions between separate building elements, such as windows, lighting, and mechanical systems.

- In buildings with skin-dominated energy loads, incorporate high levels of insulation and high-performance windows, and make buildings as airtight as possible.
- Minimize cooling loads through careful building design, glazing selection, lighting design, and landscaping.
- Utilize renewable energy resources to meet energy demand.
- Install energy-efficient mechanical equipment, lighting, and appliances.
- Assure the quality of both materials and equipment installation.

Energy efficiency measures are likely to increase first cost, but significant savings in operating cost can often be achieved. Reduced heating and cooling loads may reduce first cost of HVAC equipment, offsetting some of the expense.

#2. Recycle Buildings—Utilize existing buildings and infrastructure instead of developing open space.

Existing buildings often contain a wealth of material and cultural resources, and contribute to a sense of place. In some cases the workmanship and quality of materials they embody is almost impossible to replicate today, making their restoration all the more valuable.

- Do not ignore priority #1, above. When restoring or renovating buildings, maximize energy efficiency.
- Handle any hazardous materials appropriately (lead paint, asbestos, etc.).

Usually—but not always—restoration is less expensive than building new. These projects can be difficult to budget.

#3. Create Community—Design communities to reduce dependence on the automobile and to foster a sense of community.

To reduce environmental impacts, we must address transportation. Even the most energy-efficient, state-of-the-art passive solar house can carry a big environmental burden if its occupants have to get in a car each morning and commute 20 miles to work. Since the 1940s, zoning and land-use planning have, in general, been impediments to, rather than supporters of, responsible transportation patterns. Effective land-use planning can also help to foster strong communities.

- Design communities that provide access to public transit, pedestrian corridors, and bicycle paths.
- Work to change zoning to allow mixed-use development so residents can walk to the store or to work.
- Incorporate home offices into houses to permit "telecommuting."
- Site buildings to enhance the public space around them and maximize pedestrian access.

Smaller and shorter roads, services lines, and storm sewers reduce infrastructure costs. Obtaining zoning variances can be time-consuming.

#4. Reduce Material Use—Optimize design to make use of smaller spaces and utilize materials efficiently.

Smaller is better relative to the environment, and no matter what the materials, using less is almost always preferable—as long as the durability or structural integrity of a building is not compromised. Reducing the surface area of a building will reduce energy consumption. Reducing waste both helps the environment and reduces cost.

- Reduce the overall building footprint and use the space more efficiently.
- Simplify the building geometry to save energy and materials.
- Design building dimensions to optimize material use and reduce cut-off waste. For example, design buildings on a 2′ or 4′ (600 mm or 1,200 mm) module. With light-frame construction, use greater on-center framing spacing (19.2″ or 24″) and headers sized to each opening.

Additional design time may be needed, but overall this strategy should save money, particularly with larger projects and multiple-building developments. Increasingly, we need to consider not only the cost of buying materials but also the cost of disposing of what's left over—by reducing waste, we save both ways. A 4x10 (1,200 mm by 3,000 mm) sheet of ⅝″ (15 mm) drywall, for example, which costs about $9 to buy, now costs more than $4 to landfill in some areas!

#5. Protect and Enhance the Site—Preserve or restore local ecosystems and biodiversity.

In fragile ecosystems or ecologically significant environments, such as old-growth forests or remnant stands of native prairie, this might be the highest priority.

- Protect wetlands and other ecologically important areas on a parcel of land to be developed—on some sites you should reevaluate whether development should be carried out.

- On land that has been ecologically damaged, work to reintroduce native species.
- Protect trees and topsoil during construction.
- Avoid pesticide use—provide construction detailing that minimizes the need for pesticide treatments.
- With on-site wastewater systems, provide responsible treatment to minimize groundwater pollution—there are several innovative new wastewater treatment systems that do a better job at nutrient removal than conventional septic systems.

Some of these measures cost less than standard practice, others cost more. Maintenance costs with natural landscaping are often much less than for conventional practice.

#6. Select Low-Impact Materials—Specify low-environmental impact, resource-efficient materials.

Most—but not all—of the environmental impacts associated with building materials have already occurred by the time the materials are installed. Raw materials have been extracted from the ground or harvested from forests; pollutants have been emitted during manufacture; and energy has been invested throughout production. Some materials, such as those containing ozone-depleting HCFCs and VOCs, continue emitting pollutants during use. And some materials have significant environmental impacts associated with disposal.

- Avoid materials that generate a lot of pollution (VOCs, HCFCs, etc.) during manufacture or use.
- Specify materials with low embodied energy (the energy used in resource extraction, manufacturing, and shipping).
- Specify materials produced from waste or recycled materials.
- Specify materials salvaged from other uses.
- Avoid materials that unduly deplete limited natural resources, such as old-growth timber.
- Avoid materials made from toxic or hazardous constituents (benzene, arsenic, etc.).

Some resource-efficient products are available at no extra charge; others may cost more. Installation may differ from standard practice, raising labor cost if an installer is unfamiliar with a product.

#7. Maximize Longevity—Design for durability and adaptability.

The longer a building lasts, the longer the period of time over which the environmental impacts from building it can be amortized. Designing and building a structure that will last a long time necessitates addressing how that building can be modified to satisfy changing needs.

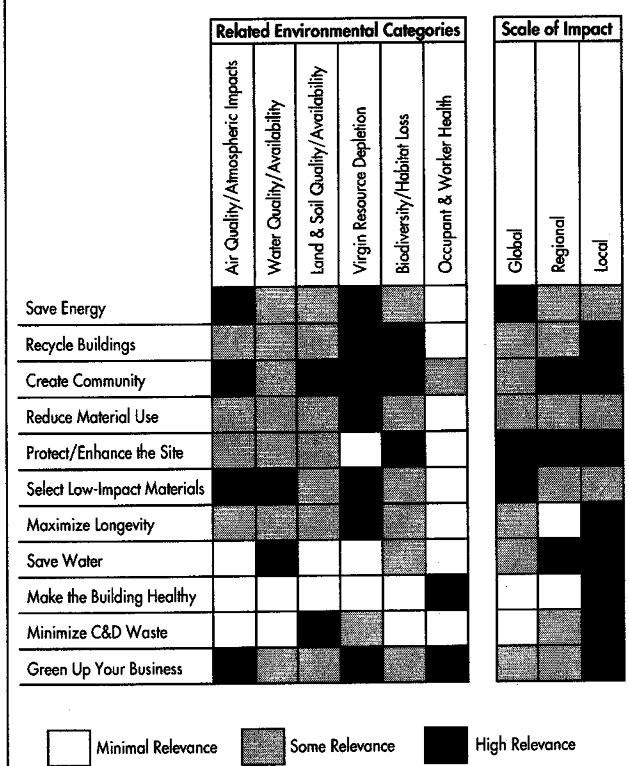
- Specify durable materials—this is usually even more important than selecting low-embodied-energy materials.
- Assure quality installation that enhances service life and, hence, resource-efficiency.
- Design for easy maintenance and replacement of less durable components.
- Design for adaptability—particularly with commercial buildings.
- Allocate an appropriate percentage of building funds for ongoing maintenance and improvements.
- Consider aesthetics during design, and whether a particular style is likely to remain popular—the idea of "timeless architecture."

Though not necessarily more expensive in all cases, building for durability usually does require a larger initial investment. Preventive maintenance also requires ongoing investment, though it is generally cheaper over the long term than repairs due to insufficient maintenance.

#8. Save Water—Design buildings and landscapes that are water-efficient.

Although this is generally a regional issue, even the Pacific North-west has experienced droughts and water issues associated with endangered salmon species. In some parts of North America, reducing water use is much higher on the priority list.

- Install water-efficient plumbing fixtures and appliances.
- Collect and use rainwater.
- Provide low-water-use landscaping (xeriscaping).
- Separate and use graywater for landscape irrigation where codes permit.
- Provide for groundwater recharge through effective stormwater infiltration designs.



In comparing relative measures, it's useful to consider the environmental issues affected by each measure and the scale of the impact.

Most of these measures will add to the cost of a project. Some savings in lower water and sewage bills and longevity of on-site septic systems can offset the additional costs. Designs that promote stormwater infiltration are usually less expensive than storm sewers.

#9. Make the Building Healthy—Provide a safe and comfortable indoor environment.
Though some people tend to separate the indoor environment from the outdoor environment, the two are integrally related, and the health of the building occupants should be ensured in any "sustainable" building. With many clients, this is the issue that first generates interest in broader concerns of environmentally sustainable building.

- Design air distribution systems for easy cleaning and maintenance.
- Avoid mechanical equipment that could introduce combustion gases into the building.
- Avoid materials with high rates of VOC offgassing such as standard particleboard, some carpets and adhesives, and certain paints.
- Control moisture to minimize mold and mildew.
- Introduce daylight to as many spaces as possible.
- Provide continuous ventilation in all occupied buildings. In cold climates, heat-recovery ventilation reduces the energy penalty of ventilation.
- Give occupants some control of their environment with features like operable windows, task lighting, and temperature controls.

Most of these measures will increase construction costs, but they often are easily justified based on the increased health, well-being, and productivity of building occupants. Failure to pursue these measures can lead to expensive "sick-building" lawsuits.

#10. Minimize C&D Waste—Return, reuse, and recycle job-site waste.
For more and more materials, sorting and recycling job-site waste is paying off economically, and it can certainly generate a good public image.

- Sort construction and demolition waste for recycling.
- Donate reusable materials to non-profit or other community groups that would use them for building or improving local housing stock.

Additional labor to sort and recycle waste is often offset by the savings in disposal costs, though these vary by region. Sorted material can sometimes be sold for a profit. Some low-value materials can be ground and recycled on-site; for example, clean wood waste can be used as an erosion-control material, and drywall as a soil amendment.

#11. Green Up Your Business—Minimize the environmental impact of your own business practices, and spread the word.
In addition to creating buildings with low environmental impact, you should practice environmentalism in your own business, thus serving as a model for other design or construction firms.

- Purchase fuel-efficient company vehicles, and promote use of public transportation and carpooling by employees.
- Use this priority list in the operation of your own business.
- Use the design process to educate clients, colleagues, subcontractors, and the general public about the environmental impacts of buildings and how they can be mitigated.

Carpooling and public transportation can save money for employees, while reducing the number of parking spaces the business must provide. Greening your business practices will help demonstrate your convictions to your clients.

Final Thoughts

In deciding which measures to pursue on specific projects, consider the relative benefits of each measure. You might begin by customizing the list for your region. In an arid climate, for example, water conservation would go near the top, while in a city prone to smog inversions, transportation alternatives might be the most important. Then refer to your list as you consider each project, and identify the areas where you can do the most for the environment.

Pick the low-hanging fruit first, and go after the tougher issues as time and resources allow. Return to buildings you've completed to see which systems are working and which aren't, and how occupants have modified your work to fit their needs. When possible, use your buildings to strengthen the link between occupants and the global environment through education and direct interaction. Finally, if you are incorporating environmental features into your work, take advantage of that fact in your marketing efforts.

Like most lists and categories, this list serves a purpose but also carries the risk of compartmentalizing the design and construction process. Often the most significant opportunities for benefiting the environment come from a careful integration of the design, taking advantage of synergies between building elements. The most elegant design solutions—those that reduce complexity while solving multiple problems—won't be found by considering each item on this list in isolation. We hope that this ranking will serve to inspire others who regularly think about environmental impacts of building to offer their opinions. Let us know your thoughts.

– Alex Wilson, Nadav Malin, and Peter Yost

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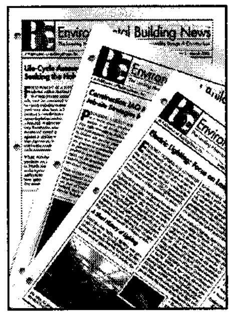

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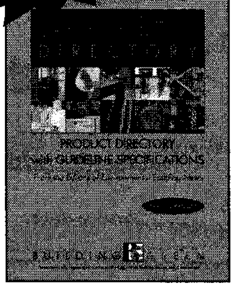

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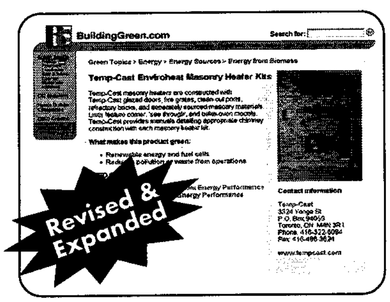

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Please see other side for information on more green building resources.

Minnesota Pollution Control Agency Pre-Demolition Environmental Checklist and Guide

MERCURY

This section of the checklist is designed to assist you in determining the likely sources of mercury in a building demolition project.

In general, do not remove the mercury from a device such as a switch. Keep the product intact and remove and store in a covered container in a manner that will prevent breakage, spillage, or release. Label and store the mercury containing devices to ensure proper handling and disposal.

This guidance will list product categories and examples from each.

Specialty Buildings and Concerns:
Hospitals, Clinics, Laboratories, Dental Offices, and Schools. Mercury can be found in sink traps and many other pieces of equipment and devices. Special care should be given to mercury items in these buildings. _____

Batteries:
Smoke Detectors: _____
Emergency Lighting Systems: _____
Elevator Control Panels: _____
Exit Signs: _____
Security systems and Alarms: _____

Lighting:
Fluorescent Lights: _____
High Intensity Discharge:
  Metal Halide: _____
  High Pressure Sodium: _____
  Mercury Vapor: _____
  Neon: _____
Switches for lighting using mercury relays: look for any control associated with exterior or automated lighting systems: _____
"Silent" Wall Switches: _____

Heating, Ventilating, and Air Conditioning Systems:
Devices in this category control a variety of functions such as water pressure, air pressure, on/off, and flow control. Check any control associated with air handling units.

Thermostats: _____
Aquastats: _____
Pressurestats: _____
Firestats: _____
Manometers: _____
Thermometers: _____

Boilers, Furnaces, Heaters & Tanks:
Mercury Flame Sensors by pilot lights: _____
Manometers, Thermometers, Gauges: _____
Pressure-trol: _____
Float or Level Controls: _____
Space Heater Controls: _____

Electrical Systems:
Load Meters and Supply Relays: _____
Phase Splitters: _____
Microwave Relays: _____
Mercury Displacement Relays: _____

Other Industrial Equipment and Areas of Mercury Concern:
Any control used for measurement of vacuum, pressure, fluid level, temperature, or flowrate could contain mercury. Included are thermostats, thermometers, manometers, pressurestats, etc. Other switches may have been used in old clocks, water cleaning systems, pneumatic control switches, and other areas.

It is the expectation of the MPCA that all equipment control boxes and panels be examined for mercury containing devices prior to demolition.

Poly-Chlorinated BiPhenyls (PCBs)

PCBs are a family of chlorinated compounds that were dielectric or especially non-conductive. PCBs are oily liquids that are usually pale yellow to clear. The following is a list of areas in buildings were PCBs may be found.

Transformers: _____
Transistors: _____
Capacitors (old appliances, electronic equipment): _____
Heat Transfer Equipment: _____
Light Ballasts: _____

Lead

Lead and lead based paint (LPB) are common items in many older buildings. The use of LPB was discontinued in 1978, however, many buildings have multiple layers of paint and should be examined carefully. Lead can be found in the following areas:

Lead Based Paint: (woodwork, metal equipment, interior/exterior uses) _____
Lead-Acid Batteries: (lighting, exit signs security systems) _____
Lead flashing molds and roof vents: _____
Lead Pipes and solder: _____

ChloroFluoroCarbons

CFCs (chlorofluorocarbons) and HCFCs (hydrochlorofluorocarbons) are man-made refrigerants that destroy the ozone layer.

Fire Extinguishers (both portable and installed halon suppression systems) _____
Air Conditioners (rooftop, room, and central) _____
Walk in Coolers (refrigeration or cold storage areas) _____
Water Fountains and Dehumidifiers: _____
Refrigerators/Freezers/Chillers: _____
Heat Pumps: _____
Vending Machines/Food Display Cases: _____

Asbestos

Asbestos is a naturally occurring mineral that separates into strong, very fine fibers. These fibers float in the air and are easily breathed into the lungs, causing serious health problems.

Asbestos is not combustible, has high tensile strength, has good thermal and electrical insulating properties, is moderately resistant to chemicals, and has good frictional properties. It is durable, flexible, strong and resistant to wear. Thus, asbestos has been used for thousands of commercial and public applications including:

Asbestos can be found in many types of building materials, products and insulation. You can't tell whether a material contains asbestos simply by looking at it, unless it is labeled. Asbestos presence or absence must be confirmed by professional sampling and laboratory analysis.

Asbestos type materials can be found on, or in:

Boiler rooms:

Boilers, Furnaces, Fireplaces, and their components: _____
Cement sheets near heating equipment: _____
Boiler insulation: _____
HVAC Duct insulation: _____
Ductwork flexible fabric connections: _____
Fireproofing materials: _____
Firedoors: _____

Flooring:

Vinyl floor tile: _____
Vinyl sheet flooring: _____
Asphalt tile: _____
Linoleum paper backing: _____
Mastic (floor tile, carpet, etc.) _____

Electrical:

Electrical panels: _____
Electrical wiring insulation: _____
Heating and electrical ducts/conduit: _____

Pipe and other insulation:

Aircell (corrugated cardboard): _____
Millboard: _____
Preform: _____
Joint compound: _____
Spray applied insulation: _____
Blown-in insulation: _____
Block: _____

Surfacing materials:

Acoustical plaster: _____
Decorative plaster: _____
Textured paints coatings: _____
Spray applied materials (acoustical, decorative, or insulative): _____

Roofing:

Roofing shingles: _____
Roofing felt: _____
Base Flashing: _____

Cement materials (Transite):

Cement pipes (flues & vent pipes) _____
Cement Wallboard: _____

Cement siding: _____
Pegboard: _____

Ceiling materials:
Ceiling tiles: _____
Ceiling tile adhesives (pucks): _____
Lay in ceiling panels: _____
Acoustical tiles: _____

Miscellaneous:
Taping, joint, and spackling compound: _____
Caulking/putties: _____
Fire curtains and blankets: _____
Laboratory hoods, table tops, gloves, etc.: _____
Gaskets: _____

OTHER

The following is a list of other environmental and regulatory issues that should be addressed prior to demolition:

Solid Waste (all non-building components such as files, books, trash, desks, chairs, etc.) must be removed prior to demolition. _____

Hazardous Waste: (all HW including household HW) must be properly handled and disposed of prior to demolition. _____

Oil: (used oil, hydraulic oils in door closers, elevator shafts, etc) must be collected and properly disposed of prior to demolition. _____

Tanks: no evidence of former heating tanks or storage tanks exists _____

This guidance document is not intended as a substitute for reading the rules and statutes and making your own independent determination of their applicability to your demolition project. **Examples in this guidance document do not represent an exhaustive listing of types of materials that may be required to be removed from a building prior to demolition.**

If you have any question or comments about this checklist, identify any additional items not found in this list, or would like to discuss an individual project, please do not hesitate to contact the MPCA demolition team at 1-800-657-3864 or (651) 296-6300.

jtc1599

Green Healthcare Construction Guidance Statement

Developed in January 2002, revised October 2004
by the Green Building Committee of the American Society of Healthcare Engineering (ASHE)
for use in conjunction with the ASHE Sustainable Design Awards Program.

Problem Statement

The construction and use of buildings in all sectors consumes 3 billion tons of raw materials annually (40% of raw stone, gravel, sand, and steel, 25% of virgin wood, 40% of energy resources, 75% of PVC, 17% of freshwater flows) and generates significant waste (25-40% of municipal solid waste from construction and demolition alone), 50% of CFCs, about 30% of US CO2 production, and substantial toxic emissions.

Given this, the opportunities are significant to improve environmental quality through green planning, design, construction and operations and maintenance practices. Improving the environment through green construction practices is consistent with the American Hospital Association's recent voluntary agreement with the United States Environmental Protection Agency to reduce waste volume and toxicity.

Building design and construction practice can be shaped to protect health at three scales:

Protecting the immediate health of building occupants
The health of patients, staff, and visitors can be profoundly affected by the quality of the indoor air which in turn is dependent upon physical and mechanical design (such as ventilation and location of wastes and toxics), the choice of building materials, the management of construction emissions, and building operations and maintenance. Additionally, access to daylighting has been found to favorably affect staff productivity and patient outcomes.

Protecting the health of the surrounding community
Local air and water quality is also significantly affected by building design choices. Off-gassing building materials and finishes, construction equipment and HVAC systems directly emit VOCs, particulates and other materials that can result in the formation of ground level ozone (smog), and cause allergic attacks, respiratory problems and other illnesses. Land use and transportation planning, landscape and water management on the grounds and water conservation efforts within the building will influence the amount of toxic emissions released to the water and air throughout the life of the building.

Protecting the health of the larger global community and natural resources
The health impact of a building stretches far beyond its immediate community. The production of building materials can result in the release of persistent bioaccumulative toxic compounds, carcinogens, endocrine disruptors and other toxic substances. These compounds threaten communities where the materials are manufactured, and, because of the long life of some of these compounds, can risk the health of communities and ecosystems far from their release.

Climate change resulting from burning fossil fuels is expected to increase the spread of disease vectors far from their current regions and destabilize ecosystems, threatening worldwide nutrition. Loss of rainforests from unsustainable forestry can result in the loss of medicines and important genetic information that could help fight disease. Moreover, release of CFCs and HCFCs damages the stratospheric ozone layer, allowing increased levels of ultraviolet rays on Earth resulting in heightened potential for skin cancer.

The Importance of Prevention
Prevention is a fundamental principle of health care and public health. Indeed, to prevent disease is preferable to treating disease after it has occurred. In the face of uncertainty, precautionary action is appropriate to prevent harm. This public health approach makes sense both in the clinical setting and in responses to environmental and public health hazards. Similarly, a precautionary and preventive approach is an appropriate basis for decisions regarding material selection, design features, mechanical systems, infrastructure, and operations and maintenance practices.

Practices: Integrating Green Principles into the Design Process

1) Integrated Design

Vision statement
Achieving an effective sustainable design requires a collaborative process engaging the multiple design disciplines, as well as users, construction managers, contractors and facility managers. The merging of ideas, perspectives and areas of expertise facilitated by an open communications process reaps multiple benefits, as the project team moves from the optimization of single systems in isolation to the optimization of the entire building enterprise. Establishing vertical support throughout the organization helps ensure success.

Goals
- Enhance cost-effectiveness by recognizing interrelationships between systems
- Enhance building performance by integrating design elements
- Encourage cross-disciplinary problem-solving
- Build support among key constituencies for sustainable design

Suggested Strategies
- Develop an environmental health vision statement for the project
- Reinforce corporate/institutional commitments to environmental health and community responsibility.
- Use cross discipline design, decision making, and charettes
- Use goal setting workshops and build a team approach
- Engage owner, staff, contractors, user groups and community groups, educating them on the benefits of green design and bringing them in to the design process
- Use computer-modeling tools such as DOE-2, Energy 10, Radiance to optimize the interactions of different elements (e.g., orientation, insulation, HVAC sizing)

2) Site Design

Vision Statement
The introduction of a building to a site inevitably causes disruptions that affect the health of the local ecosystem. Good site design recognizes the ecological integrity of a site, whether it be a brownfield or a greenfield, and pursues strategies that minimize disruptions such as erosion and habitat displacement and, better, contribute to site restoration. Understanding the building as a series of flows enables the physical structure to achieve a good fit. Site location should reflect a consideration to lessen the ripple effect of the building on the surrounding community by enabling easy access by healthy transportation modes such as walking, bicycling and mass transit.

Goals
- Maintain and restore site biodiversity
- Minimize site development footprint
- Reduce storm water run-off
- Eliminate toxic chemical application for pest and vegetative control
- Optimize design for the local micro-climate and reduce dependence on mechanical systems for building operations
- Reduce reliance on single-occupancy vehicles
- Integrate design and orient building to take advantage of local micro-climate for heating, cooling, shading, ventilation and daylighting *(See also Energy)*
- Eliminate light trespass from the building site, improve night sky access, and reduce development impact on nocturnal environments

Suggested Strategies

- Evaluate brownfield sites to determine appropriate reuse for health care facilities
- Reuse and renovate existing buildings
- Site buildings in urban areas with existing infrastructure
- Avoid agricultural land, 100 year flood plains, threatened or endangered species habitat, wildlife corridors, wetlands
- Orient buildings to make best use of solar energy for heating or daylighting
- Orient buildings to encourage natural ventilation and passive cooling
- Design to reduce erosion and run off into sewer systems and/or air pollution
- Reduce building footprint, optimize layouts and reduce size of roads, parking and other site improvements to concentrate and limit total paving and other site disturbance
- Minimize impervious cover by using open-grid and pervious paving materials
- Maximize preservation and restoration of biodiverse open space/habitat
- Use native trees, shrubs and plants
- Develop and implement an integrated pest management plan
- Use vegetative and other shading techniques to assist passive cooling and ventilation of buildings and public and paved areas
- Site in proximity to transit options
- Establish a transportation plan. Support alternatives to fossil fueled single occupancy vehicles (preferred van/carpool parking, bike parking and changing facilities, electric car charging and other alternate vehicle fueling, nearby transit access). Reduce paved parking area appropriately.
- Design in accordance with Illuminating Engineering Society of North America (IESNA) footcandle requirements as stated in the Recommended Practice Manual: *Lighting for Exterior Environments*, and design interior and exterior lighting such that zero direct beam illumination leaves the building site.

(See Water and Energy for more site design issues)

3) Water

Vision Statement

Water efficient design strategies balance water quality and quantity demands within a building and are responsive to the watershed's capacity as source and sink. Public works projects, such as treatment plants and sewage systems, are unable to adequately remove or process the toxic materials that infiltrate these systems, potentially threatening public health. Take a systematic look to identify potential water sources, how water is used in the building and how it flows around the building site to reduce water usage and wastewater discharges.

Goals

- Minimize the use of potable water while conserving water quality and availability
- Minimize off site treatment of wastewater
- Minimize storm water release from the site
- Maximize use of on-site water resources, (e.g., rainwater, greywater)
- Match water quality with end use requirements
- Maximize aquifer recharge

Suggested Strategies

- Specify EPA Energy Star and high performance fixtures and equipment: e.g., low flow and pressure assist toilets and urinals; waterless urinals; low-flow showerheads and faucets; automatic use activation on sinks, toilets and urinals; Energy Star dishwashers and laundry equipment; ozone-injected laundry equipment
- Maximize water conservation in cooling towers by using non-potable site recycled water for cooling tower makeup, or use non-evaporative condenser heat rejection equipment (air cooled, or ground source)
- Specify native plants that are tolerant of local climate, soils and water

- Install drip irrigation and high efficiency irrigation control (moisture sensors, weather based controllers)
- Implement appropriate, safe strategies to recycle site waste water (e.g. gray water or condensate) and/or municipal secondary treated water for irrigation, sewage conveyance, and toilet flushing
- Collect storm water runoff from roofs and site and use for irrigation, sewage conveyance, toilet flushing and/or HVAC/process makeup water or recharge in to aquifer
- Minimize hardscapes and install permeable paving and other pervious surface materials
- Create wetlands or other systems to locally recharge underground water flows

(Operations & Maintenance Section for additional Water issues)

4) Energy

Vision Statement
The burning of fossil fuels is the single largest contributor to global climate change, as well as a contributor to a host of toxic emissions that impair the environmental health of directly affected communities and the world. Rising energy prices impose a significant economic imperative that requires a careful examination of understanding how to best assure a comfortable healthy indoor environment supportive of patient recovery with a significantly reduced energy demand. Take a comprehensive, systematic look at the building and site's energy flows to reduce energy bills, evaluate opportunities for reliance on renewable energy sources, and improve environmental health outcomes.

Goals

- Reduce building energy demand
- Reduce emissions from energy use
- Reduce reliance on energy generated by fossil fuels
- Maximize use of energy generated by renewable sources

Suggested Strategies

- Use ASHRAE 90.1-1999 as basis of design to optimize thermal envelope performance and evaluate and document opportunities to exceed
- Use energy simulation tools, such as DOE2, Energy 10, Radiance, to optimize interactions between building elements and optimize design
- Optimize layout and orientation of building to optimize energy performance
- Design for appropriate daylighting strategies that reduce heat gain and control glare and contrast
- Specify efficient lighting fixtures
- Specify user controls and ambient condition lighting controls integrated with daylighting
- Specify efficient HVAC equipment (high efficiency, appropriately sized, low NOX)
- Specify EPA Energy Star electrical equipment and appliances
- Specify solar water heating and low-flow hot water fixtures and appliances
- Specify zoning and controls for mechanical equipment to optimize use
- Specify EPA Energy Star™ roofing materials and/or green roofs to reduce cooling loads and heat island effect
- Develop a commissioning plan and hire an independent Commissioning Agent (*See also Commissioning Section)*
- Specify HVAC, refrigeration & fire suppression equipment that do not utilize CFCs and halons. When reusing existing base building HVAC equipment, develop a comprehensive CFC phaseout conversion. Balance ozone depletion potential (ODP) of HCFC alternatives with global warming potential (GWP) *(Refer to Materials Section for further guidance concerning considerations on materials to avoid in energy related equipment and design).*
- Evaluate feasibility for and specify cogeneration, fuel cells, renewable energy systems (such as photovoltaics, wind, biomass and low impact hydroelectric) and other alternative energy sources
- Design for continued monitoring and verification of system performance

- Purchase green energy where available that meets the Center for Resource Solutions Green-e products certification requirements.

(See Site for transportation and climatic design issues)

5) Indoor Environmental Quality

Vision Statement
Growing awareness about the relationship between indoor environmental quality – materials, lighting, thermal comfort – and human health and productivity has catalyzed substantial research to support healthier buildings. Eliminating materials identified as allergens, mutagens, carcinogens and endocrine disruptors, while providing access to daylight and comfortable indoor climate, are fundamental green building elements. Engage in a design process that balances the objectives of a well daylit, comfortable, energy efficient and non-toxic indoor environment and results in improved productivity and patient outcomes.

Goals

- Provide an environment for occupants that is healthy and encourages rapid patient recovery and staff productivity
- Minimize production and distribution of pollutants
- Provide occupants with access to daylight and views
- Provide energy efficient thermal comfort
- Provide occupant environmental controls (light, view, thermal, ventilation)
- Provide appropriate air changes with sufficient percentage of fresh air

Suggested Strategies

- Ensure high quality indoor air by meeting or exceeding ASHRAE 62-1999 as a basis of design
- Ensure thermal comfort by meeting or exceeding ASHRAE 55-1992 as a basis of design
- Specify low VOC / low toxic finishes and materials, such as Green Seal-certified paints; composite wood and agrifiber products with no added urea-formaldehyde resins; carpet systems certified by Carpet & Rug Institute Green Label Program; adhesives meeting South Coast Air Quality Management District guidelines; flooring, ceiling wall covering, paints and other interior finishes and materials meeting Washington State indoor air quality guidelines
- Minimize use of carpets and other materials that attract, absorb and re-release indoor pollutants
- Specify permeable wall covering and other materials to prevent trapping of water and microbial growth
- Establish green housekeeping protocols (*See Operations & Maintenance section*)
- Design to reduce pest infestation opportunities
- Install permanent entryway systems (e.g., grates) to trap dirt and particulates
- Position air intakes to prevent contamination from vehicle exhaust and other sources paying attention to prevailing winds
- Assure easy access to inspect and clean filters and ductwork in each straight run
- Ventilate enclosed parking areas and other source areas (smoking areas, housekeeping, copying rooms, hazardous waste)
- If building cannot be 100% non smoking, provide total environmental separation for non smokers and assure no feed in to ventilation system
- Provide building occupants access to daylight, views and operable windows where appropriate
- Provide user controls for airflow, temperature, light (integrated with daylighting - see also Energy section)
- Provide carbon dioxide monitoring system to provide feedback on space ventilation performance
- Specify materials, products, mechanical systems and design features to attenuate sound and vibration, and not to exceed Room Criteria (RC) ratings listed for Hospital and Clinics in Table 34 of Chapter 46, Sound and Vibration Control, 1999 ASHRAE Application Handbook

(See also Operations and Maintenance)

6) Materials & Products

Vision statement
Use of sustainable materials can significantly enhance a building's environmental health performance. The sustainable harvest of materials enhances the health of habitats and increases biodiversity. The Memorandum of Understanding between the US EPA and AHA establishes minimizing production of persistent and bioaccumulative toxics (PBTs) and reducing waste as priorities for the health care industry. Review material specifications to eliminate those that contribute to harmful health affects.

Goals
- Reduce resource depletion
- Reduce embodied energy
- Reduce toxics generated throughout the life cycle of materials
- Reduce waste
- Reduce impact of reuse or disposal of building

Suggested Strategies
- Reuse existing structures
- Specify materials free from ozone depleting substances and/or equipment using CFCs, HCFCs, and halons, balancing ozone depletion potential (ODP) with global warming potential (GWP)
- Specify materials free from toxic chemicals and that do not release toxic byproducts throughout their life cycle, particularly those toxins that are carcinogenic, persistent or bioaccumulative. Key materials to avoid include mercury (switching equipment), arsenic (pressure treated wood), urea formaldehyde (engineered wood), and asbestos
- Specify materials and products that are:
    - Recycled (preferably with high post consumer content), reused/salvaged, remanufactured or from rapidly renewing sustainable sources
    - Sustainably harvested (e.g., specify FSC certified wood products)
    - Obtained from local sources
    - Low in embodied energy
    - Durable
    - Low in VOC and/or other chemical emissions in use (see IEQ section)
    - Low maintenance and not requiring toxic materials to maintain and/or operate
    - Easily reusable, recyclable, compostable, or otherwise biodegradable on disposal
- Design for efficient material use i.e., less material use and standard sizes to reduce waste
- Design for adaptability of building design as user needs change (e.g., reusable movable office divider walls and raised floor systems to enhance future flexibility)
- Design for disassembly and recycle or reuse at end of building life
- Prioritize sensitive areas (e.g., neonatal intensive care units, pediatrics, and maternity departments)
- Specify a careful product substitution review procedure to insure that environmental health performance is not degraded by contractor substitutions

7) Construction Practices

Vision Statement
The construction process affects every facet of design, from site, to materials, to mechanical systems, to indoor environmental quality, and to waste generation. Construction practices will have a significant direct impact on the health of the local environment during construction and will determine if the building achieves its long term health and sustainability goals. The construction team, including construction management, general contractor, and subcontractors are all integral to achieving these goals. The team in place during Construction Administration needs to be fully informed of and, preferably, have a role in developing, the project's sustainable design vision and goals.

Goals
- Establish a partnering relationship between all parties; engage subs and crews
- Maximize reduction, reuse or recycling of construction, demolition and land clearing debris
- Establish appropriate protocols for safe, appropriate management of toxins associated with renovation and demolition.
- Eliminate use of toxic substances, particularly those that are persistent and bioaccumulative
- Protect materials from contamination
- Ensure good indoor air quality
- Control erosion to reduce negative impacts on water and air quality

Suggested Strategies
- Implement a waste management plan for separation and recycling or reuse (including composting, chipping, mulching) of construction, demolition and land clearing debris (CD&L) and proper disposal of residual materials. Crush and reuse demolished concrete, asphalt and masonry for beneficial on-site or off-site use
- Survey for hazardous materials in demolition or renovations (mercury, asbestos and lead) and plan for safe remediation or removal and disposal
- Minimize packaging waste and reuse or return packaging waste to suppliers or manufacturers for reuse/recycling; recycle all packaging that cannot be reused or returned.
- Sequence work phases to minimize negative impacts on habitat and on ambient and indoor air quality
- Implement a site sedimentation and erosion control plan
- Follow the SMACNA (Sheet Metal & Air Conditioning Contractors National Association) IAQ Guidelines for Occupied Buildings Under Construction (e.g., dust control measures, protection of absorptive materials from moisture damage, sequencing installation of interior materials to avoid absorption of volatile organic compounds)
- Allocate time, prior to occupancy, for building flush-out appropriate to climate using new filtration media to assure removal of initial outgassing emissions
- Engage crews, including subcontractor crews, in education sessions to familiarize them with the reasons for and importance of green design and construction practices and to solicit their feedback

8) Commissioning

Vision
The commissioning process ensures the building owner and occupants that all mechanical, electrical and plumbing equipment are operating consistent with the Design Intent Document, and exceeds conventional testing and balancing procedures. An independent third-party commissioning agent offers an objective review and should be part of the design team from the earliest stages.

Goals

- Assure that building elements are installed and calibrated properly to meet the project's environmental health goals in addition to mechanical, electrical and plumbing system performance parameters
- Assure that building occupants are appropriately trained and that thorough and explicit written materials are in easily identifiable and accessible places to ensure proper operating and maintaining of building systems to meet goals

Suggested Strategies

- Contract an independent commissioning agent
- Clearly document design intent
- Specify commissioning requirements, including a commissioning plan
- Review carefully at construction documents and occupancy phases
- Develop an O&M manual for systems operations and ongoing monitoring and calibration
- Verify installation, operation to specifications, training, documentation and access to documentation
- Evaluate post-occupancy commissioning at 6 month or 1 year intervals to ensure continued system effectiveness

9) Operations & Maintenance

Vision Statement

The planning and implementation of a building's operations and maintenance are essential to benefit from the building's healthy green design features. Buildings are designed to last many decades. Practices employed during the life of the building should reflect a commitment to the hallmarks of sustainable building: high performing mechanical systems, healthy indoor air quality, continual recognition of life cycle impacts of materials and methods employed.

Goals

- Reduce the "ecological footprint" associated with materials and methods used during a building's occupancy phase
- Commit to a process of continuous improvement to enhance the building's envi ronmental health performance
- Educate the community

Suggested Strategies

- Program and design adequate dedicated storage and flow space to facilitate recycling and composting of waste.
- Program and design adequate dedicated storage and flow space and cleaning/sanitation facilities to facilitate reuse of items such as medical products, linens, and food service items to replace disposables and reduce waste.
- Program and design adequate dedicated storage and flow space for separation and management of hazardous wastes
- Provide educational opportunities (meetings, newsletters) for all building staff on the building's green design features – the direct and indirect benefits of green design and their role to optimize its performance
- Prepare building operating manuals, to include:
    - Contacts of all involved in design and construction
    - Design Intent documents and as built construction drawings
    - Manuals for all mechanical and electrical systems including how to maximize their efficient operation and how they interact with other building elements
    - System performance monitoring and inspection schedules and protocols, and other ongoing commissioning requirements
    - Green cleaning and maintenance protocols for mechanical equipment, glazing, finish surfaces, lighting and plumbing fixtures and all other housekeeping responsibilities

    - Manufacturers and service/repair contacts for all components
    - Integrated Pest Management practices
- Provide community education (press releases, newsletters, meetings, tours, interpretive displays) on the building's green features

10) Innovation

Vision
Every building is a unique blend of site, program, people, budget, with a unique set of challenges and opportunities. Innovative, integrative design practices recognize that new solutions emerge from a process that engenders creative problem solving and "thinking out of the box". We encourage you to delve into an exploratory process to discover new benchmarks for 21st century health care facilities.

SOURCES:

Minnesota Sustainable Design Guide, University of Minnesota, http://www.sustainabledesignguide.umn.edu/

Leadership in Energy & Environmental Design (LEED), US Green Building Council www.usgbc.org

NY High Performance Building Guidelines, New York City Department of Design and Construction, http://www.ci.nyc.ny.us/html/ddc/html/highperf.html

BREEAM, ECD Energy and Environment Canada, www.breeamcanada.ca

FOR MORE INFORMATION ON THE SUSTAINABLE DESIGN AWARD PROGRAM:

American Society for Healthcare Engineering
American Hospital Association
One North Franklin, Suite 2800
Chicago, IL 60606
Attn: Ilse Almanaza, Director Professional Development
ashe@aha.org
www.ashe.org

Green Building
Cost Reports & Technical Guidance

GSA LEED Cost Study — Oct 2004 — 578 pages

http://www.wbdg.org/ccbref/ccbdoc.php?category=gsa&docid=280&ref=1

The U.S. General Services Administration (GSA) commissioned this ground breaking study, completed in October 2004, to estimate the costs to develop "green" federal facilities using the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Building Rating System, Version 2.1. The report provides a detailed and structured review of both the hard cost and soft cost implications of achieving Certified, Silver, and Gold LEED ratings for two GSA building types, using GSA's established design standards as the point of comparison. The two building types examined in the study are:

1. A new mid-rise federal Courthouse (five stories, 262,000 GSF, including 15,000 GSF of underground parking; base construction cost is approximately $220/GSF)
2. A mid-rise federal Office Building modernization (nine stories, 306,600 GSF, including 40,700 GSF of underground parking; base construction cost is approximately $130/GSF).

These building types reflect a significant percentage of GSA's planned capital projects over the next five to ten years.

Costs and Financial Benefits of Green Buildings — Oct 2003 — 134 pages

A Report to California's Sustainable Building Task Force
www.ciwmb.ca.gov/greenbuilding/Design/CostIssues.htm

While the environmental and human health benefits of green building have been widely recognized, this comprehensive report confirms that minimal increases in upfront costs of about 2% to support green design would, on average, result in life cycle savings of 20% of total construction costs -- more than ten times the initial investment. For example, an initial upfront investment of up to $100,000 to incorporate green building features into a $5 million project would result in a savings of $1 million in today's dollars over the life of the building. (There are also other related reports at this website.)

Managing Costs of Green Building — Oct 2003 — 90 pages

California Schools, Libraries, Labs, Multihousing
http://www.mass.gov/envir/Sustainable/resources/pdf/managing_costs_green_buildling.PDF

…there is currently little published information available on how to economically build green on these non-office projects. This report begins to address that issue by providing general cost-saving strategies for green building, and by exploring the cost issues associated with four specific building types in the context of the green building rating systems most commonly used for that sector:

K-12 Schools LEED and CHPS
Laboratories LEED and Labs21 EPC
Libraries LEED
Multi-Family Affordable Housing

This report does not seek to quantify the true cost of green buildings. In time, green building may become mainstream -- the cost premium associated with sustainability is already shrinking. In the meantime this study identifies areas where costs may be incurred and suggests opportunities and strategies for managing them.

<u>Costing Green: A Comprehensive Cost Database and Budgeting Methodology</u>
July 2003 70 pages
www.davislangdon-usa.com/publications.html

If there is a cost premium to sustainable construction, it's far less than what many people have been assuming. This is one conclusion of this study conducted by Lisa Fay Matthiessen and Peter Morris of Davis Langdon Adamson (DLA), an international management construction firm. Using an extensive database of DLA projects, the study compared the cost of Leadership in Energy and Environmental Design (LEED) projects and those not pursuing LEED certification. They normalized for other significant construction factors, building type, location, climate, local standards, market conditions, building size, etc. The result was "no statistically significant difference between the LEED population and the non-LEED population." The authors conclude that many projects can achieve sustainable design within the existing budget, or with a very small supplemental budget. The best way to budget for sustainable features, according to Matthiessen and Morris, is to set project goals and then budget for them accordingly. If green features are perceived as "extras" then the costs will also be considered above the norm. Making green construction as fundamental as plumbing will tend to bring the project cost in line with comparable structures.

Technical Guidance

The Univ of Buffalo has recently issued a **High Performance Building Guidelines** manual that's at: http://wings.buffalo.edu/ubgreen/leos/ubhpguidelines.pdf (157pgs, takes a while to load) It contains some very specific recommendations. It can be used like a checklist of green building ideas. http://wings.buffalo.edu/ubgreen/guidelines.html

The **Whole Building Design Guide** website, www.wbdg.org has draft specs for federal green building that provide the reason behind them. Open Design Guidance/Products & Systems on the left. The Specifications are then at the bottom. The direct link is www.wbdg.org/design/greenspec.php

The federal government also has the **"Greening Federal Facilities"**. It is 211 pages and covers each area from site selection, energy, waste water, etc. They describe it as covering all the nuts and bolts of the process. www.eere.energy.gov/femp/technologies/sustainable_greening.cfm

Coproduced by the USGBC, the **Sustainable Building Technical Manual** is a source of design guidance information. It can be found, with many other publications at the site below. Check near the end of the list under 'facilities'. www.greenbiz.com/toolbox/reports.cfm

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Construction Related Environmental Publications B. 5

DEQ

Environmental Science and Services Division
Michigan Department of Environmental Quality
PO Box 30457 Lansing, MI 48909-7957

INSTRUCTIONS: To request publications, indicate quantity in the appropriate boxes on the publication listing, complete the following information, and mail to the address below, or fax to: 517-241-3571, or call 1-517-335-6250. For general information, contact the Environmental Assistance Center (EAC center) at 1-800-662-9278. Internet web addresses are provided for all publications available on the Internet to reduce paper usage and provide direct access to information. If you have any suggestions or comments, please forward them to the address below.

Name:		Phone: with area code
Company Name:		
Address:		
City:	State:	Zip Code:
Email:		

Mail Request To:
Ms Maggie Fields
Environmental Science and Services Division
Michigan Department of Environmental Quality
PO Box 30242
Lansing, Michigan 48909

Index

A copy of this can be emailed so you can use the links to get electronic copies of the documents without typing them. If submitting for hardcopies, indicate the quantity you are requesting in the checkboxes provided.

About DEQ

☐ **DEQ Divisions & Offices Guide** — 2 pages

Website: www.deq.state.mi.us/documents/deq-ead-guide-deqguide.pdf
Description: A short summary of each of the divisions

☐ **Division Guides, Organizational Charts and Office contacts** — various

Website: http://www.michigan.gov/deq
Description: From this website, choose 'Inside DEQ' - 'Contact DEQ' to see or print information on the Divisions and their organizational charts. The local district office contact numbers are listed under 'DEQ Locations'. Hard copies can also be sent.

Air

☐ **Asphalt Plants – Emission Calculation Fact Sheet – Hot Mix Asphalt** — 3 pages

Website:
www.deq.state.mi.us/documents/deq-ead-caap-maers-EmissionCalculation-asphaltplants.pdf
Description: This document lists Source Classification Codes (SCC) and emission factors for various activities at hot mix asphalt (HMA) plants as an aid in calculating emissions from HMA facilities.

☐ **Burning – Builder Burning** — 4 pages

Website: http://www.deq.state.mi.us/documents/deq-ess-caap-BuilderBurning.pdf
Description: This is a Wisconsin publication that discusses the toxic smoke emitted by burning building materials and the benefits of recycling.

☐ **Burning – Open Burning Guide** — 8 pages

Website: www.deq.state.mi.us/documents/deq-ess-caap-openburningguide.pdf
Description: A discussion and review of Michigan regulations on open burning.

☐ **Managing Fugitive Dust - A Guide for Compliance with the Air Quality Regulations for Particulate Matter Generation** — 47 pages

Website: www.deq.state.mi.us/documents/deq-ead-caap-genpub-FugDustMan.pdf
Description: An explanation of the federal and state statutes and rules that apply to the fugitive dust. It also provides information on how to minimize fugitive dust generation…

☐ **What is an Air Contaminant/Pollution? Fact Sheet** — 8 pages

Website: www.deq.state.mi.us/documents/deq-ead-caap-airconfs.pdf
Description: A discussion of the various types of air pollutants.

Compliance Assistance

☐ **Construction Industry Compliance Assistance Center** - federal — NA

Website: http://www.cicacenter.org/
Description: A website developed in partnership between industry reps and EPA.

☐ **Federal Environmental Requirements for Construction** - EPA — 8 pages

Website: http://www.epa.gov/compliance/resources/publications/assistance/sectors/fedenvconstruction.pdf
Description: This provides an overview of the different federal regulations that might apply to a construction project. Several construction associations partnered with EPA to develop this resource.

☐ **Michigan Manufacturers' Guide to Environmental, Safety and Health Regulations. –** Complete reference or 1 page Order form — Document = inches

Website: http://www.deq.state.mi.us/documents/deq-ead-caap-eqp3569.pdf (order form)
http://www.michigan.gov/deq/0,1607,7-135-3307_3668_4151-15820--,00.html (document)
Description: This reference can be down loaded from the website for free or hardcopies can be ordered for $15. The guidebook is divided into three main sections: environmental regulations; Michigan Occupational Safety and Health Act (MIOSHA) standards; and construction and fire codes.

☐ **Permit Checklist** — 2 pages

Website: http://www.deq.state.mi.us/documents/deq-ead-permits-eqp3580.pdf
Description: This provides a quick idea what activities might involve DEQ regulations.

Finance

☐ **Cost & Financial Benefits of Green Buildings** — 174 pages-full, 6pg summary

Website: www.ciwmb.ca.gov/greenbuilding/Design/CostIssues.htm
Description: The report "finds that an upfront investment of less than two percent of construction costs yields life cycle savings of over ten times the initial investment."

☐ **GSA Study of LEED (Green Buildings)** — 178 pages-full

Website: www.wbdg.org
Description: Completed in October 2004, the study estimates the costs to develop "green" federal facilities using the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Building Rating System, Version 2.1. The report provides a detailed and structured review of both the hard cost and soft cost implications

☐ **Finance and Sustainability -- Green Buildings** — NA

Website: www.sustainable.doe.gov/financing/green.shtml
Description: A website of links relating to energy efficiency

Website: www.fundinggreenbuildings.com
Description: A website of links selling a resource book on funding.

Website: www.epa.gov/region5/sue/pdfs/greenbuilding.pdf
Description: An EPA 2000 report "Green Building Re$ource" that lists green building funding sources.

Website: http://www.kresge.org/initiatives/green_ini.htm
Description: The Kresge Foundation green building initiative.

☐ **Small Business Pollution Prevention Loan Program Company Brochure** — 2 pages

Website: www.deq.state.mi.us/documents/deq-ead-p2-loan-compbroch.pdf
Description: A description of the DEQ P2 loan program.

☐ **Small Business Pollution Prevention Loan Program Potential Projects** — 4 pages

Website: www.deq.state.mi.us/documents/deq-ead-p2-loan-potentialp2.pdf
Description: A listing of the fundable projects.

Green Building

☐ **Buy Recycled Construction Products – EPA** — 12 pages

Website: www.epa.gov/epaoswer/non-hw/procure/products/building.htm
Description: This provides case studies and specs for recycled content materials.

☐ **Energy Resource List** — 2 pages

Website: http://www.deq.state.mi.us/documents/deq-ess-p2-p2week-EnergyResources.doc
Description: This is a list of websites that might assist in energy efficiency efforts – industrial, commercial and residential.

☐ **Green Building Guidelines – SBIC** – home construction — $50 - SBIC

Website: www.sbicouncil.org/store/index.php
Description: This was produced by builders for builders and presents design strategies that will help integrate energy and resource efficiency, passive solar techniques, improved indoor air quality, and green building materials.

☐ **Green Building Resource List** — 2 pages

Website: www.deq.state.mi.us/documents/deq-ess-p2-p2week-greenbuildingResources.doc
Description: A listing of key websites, magazines, software and associations for green building information for the commercial, industrial and residential areas.

☐ **How to Save Energy in New and Existing Homes** — 2 pages

Website: http://www.michigan.gov/cis/0,1607,7-154-25676_25692---,00.html
http://www.urbanoptions.org
Description: A brochure of ideas. There are more resources at these websites, including information on energy star ratings of homes and renewable energy links.

☐ **Green Building: A Primer for the Consumer, Realtor, etc - BEST** — 11 pages

Website: http://www.energybuilder.com/greenbld.htm
Description: This discusses what it is and 'why' someone should want a green home.

☐ **Checklist for Environmental Responsible Design & Construction – EBN**
Establishing Priorities with Green Building - EBN — 8 pages

Website: www.buildinggreen.com Available only if you're a member but DEQ has permission to distribute hard copies.
Description: These provide simple, direct points to consider during design and construction.

☐ **Residential Certification - BuiltGreen**

Website: http://www.builtgreen.org/
Description: This is Colorado's certification program used to determine what is a 'green' home. This is one of many in the country. NAHB has a committee that intends to develop a national program by November, 2004. LEED is also developing a residential certification program.

☐ **Sustainable Building Technical Manual** — 292 pages

Website: www.usgbc.org
http://www.greenbiz.com/resources/greenbuild/tools.cfm?LINKADVID=8900
Description: The building guide walks planners through the major phases of a green construction project. This was a partnership between U.S. Green Building Council, the U.S. Department of Energy, the U.S. Environmental Protection Agency and Public Technology Inc.

Land – includes tanks & contamination issues

☐ **Baseline Environmental Assessment & Due Care Citizen Guides** — BEA 6 pages; DC 3 pages

Website: http://www.michigan.gov/deq/0,1607,7-135-3311_4109_4212---,00.html
Description: These provide guidance for developing contaminated properties.

☐ **Community Redevelopment Program** — 2 pages

Website: www.deq.state.mi.us/documents/deq-ead-comredev-commredv.pdf
Description: An overview of what the program does.

☐ **Contaminated Property - Part 201 Citizen's Guide What You Need to Know if You Own or Purchase Property With Environmental Contamination**	4 pages

Website: www.deq.state.mi.us/documents/deq-erd-part201-citguide.pdf
Description: Contents are as described in the title – aimed at commercial /industrial ownership.

☐ **Preventing Groundwater Contamination**	10 pages

Website: www.deq.state.mi.us/documents/deq-ead-tas-grwtrcon.pdf
Description: This describes the common sources of contamination from an industrial operation.

☐ **Secondary Containment - Pollution Incident Prevention Plan Packet**	29 pages

Website: www.deq.state.mi.us/documents/deq-ead-tas-pipp5summary.pdf
Description: Document explaining the design of secondary containment.

☐ **Tanks - Aboveground Storage Tank Program - An Overview**	3 pages

Website: www.deq.state.mi.us/documents/deq-ead-tas-astbroch.pdf
Description: An overview of the above ground tank program requirements.

☐ **Tanks - Home Heating Oil Tanks Brochure**	2 pages

Website: www.deq.state.mi.us/documents/deq-ead-tas-htgoilbroc.pdf
Description: Information on how to prevent leaks and how to handle them if they occur.

☐ **Tanks - Tips for Underground Storage Tank Owners and Operators**	6 pages

Website: www.deq.state.mi.us/documents/deq-ead-tas-stdtips.pdf
Description: An overview of the under ground tank program requirements.

Recycling & Deconstruction

☐ **Building a Deconstruction Company**	94 pages

Website: http://www.ilsr.org/recycling/indexdeconstruction.html
Description: The manual takes the reader through the steps of forming a deconstruction company from setup and funding, to planning, deconstruction, and material resale.

☐ **Building Materials Recycling Resources**	6 pages

Website: www.deq.state.mi.us/documents/deq-ess-p2-p2week-DeConstructionResources.doc
Description: This is a list of websites, companies and recyclers like habitat for humanity restores in Michigan and other useful recycling resources for deconstruction or construction wastes.

☐ **Characterization of Construction & Demolition Debris** -EPA	94 pages

Website: www.epa.gov/epaoswer/hazwaste/sqg/c&d-rpt.pdf
Description: It is an attempt to quantify and categorize construction wastes. The data is from 94-96.

☐ **Contractor's Guide to Recycling**	36 pages

Website: www.resourceventure.org/rv/issues/building/get-started/cons-wste-mgmt/index.php
Description: This gives some practical tips on setting up a recycling program for construction waste.

☐ **Guide to Deconstruction** (& Community Development Opportunities)	18 pages

Website: http://www.hud.gov/deconstr.pdf
Description: This provides an overview of deconstruction—its components, its benefits, case examples, and how to make it part of a community revitalization strategy. Written by NAHB for HUD.

Guide to Deconstruction - Fla	93 pages

Website: http://www.deconstructioninstitute.com/index.php
Description: A step by step guide covering many aspects of the process. Written by the University of Florida's Institute for Deconstruction. This is listed under the learning center. They also have a checklist of the equipment needed to do a deconstruction and a weight conversion list.

Building Savings - EPA	20 pages

Website: http://www.epa.gov/epaoswer/non-hw/debris/waste.htm
Description: This report includes case studies of a variety of projects and how they saved money by recycling construction and deconstruction wastes.

NAHB Deconstruction Brochure	4 pages

Website: http://www.epa.gov/epaoswer/non-hw/debris/pubs/decon_br.pdf
Description: An overview with statistics about waste and the construction industry.

Waste & Hazardous Materials

Generator - Small Quantity Generator Requirements	5 pages

Website: www.deq.state.mi.us/documents/deq-ead-tas-wmd-smallqgr.pdf
Description: An overview of the requirements.

Generator - Conditionally Exempt Small Quantity Generator Requirements	2 pages

Website: www.deq.state.mi.us/documents/deq-ead-tas-wmd-cesq0997.pdf
Description: An overview of the requirements.

Mercury - Merc Concern	4 pages

Website: http://www.michigan.gov/deq/0,1607,7-135-3585_4127_4175-11698--,00.html
Description: This provides an overview of the issues involved with mercury.

Mercury Spills - Cleaning up Small Mercury Spills	4 pages
Steps for Responding to a Large Elemental Mercury Spill	2 pages

Website: http://www.michigan.gov/deq/0,1607,7-135-3585_4127_4175-11698--,00.html
http://www.michigan.gov/deq/0,1607,7-135-3585_4127_4175-11751--,00.html
Description: These provide instructions for doing cleanup.

PCB's in Fluorescent Light Fixtures	3 pages

Website: www.deq.state.mi.us/documents/deq-ead-tas-wmd-pcbflour.pdf
Description: Useful information for deconstruction – ballasts before 1978 may contain PCBs.

Radon – Building Radon Out (New Construction)	81 pages
Consumer's Guide to Radon Reduction	20 pages
Radon Mitigation Standards (Retrofit)	21 pages

Website: www.michigan.gov/deq/0,1607,7-135-3310_4104_4196-10570--,00.html
www.epa.gov/iaq/radon/pubs/index.html
Description: "Building Radon Out" is a detailed how-to booklet.
The others provide discussion but not instruction.

Universal Waste	8 pages

Website: www.deq.state.mi.us/documents/deq-wmd-universl.pdf
Description: This provides an overview of the benefits of managing universal wastes.

Water

☐ **Landscaping – Green Landscaping with Native Plants** **- Water Efficient Landscaping**	website 15 pages

Website: www.epa.gov/greenacres
www.epa.gov/owm/water-efficiency
Description: Designed to help gardens be less water and time demanding.

☐ **Non Point Source : Brown Water – Green Weeds**	

Website: None
Description: This discusses the damage soil erosion causes to lakes and streams.

☐ **Ponds - Building a Pond**	4 pages

Website: www.deq.state.mi.us/documents/deq-ead-pondlwmd.pdf
Description: This provides some tips on what to plan and guidance on whether a permit is required.

☐ **Stormwater Training Manual** - construction	77 pages

Website: http://www.michigan.gov/deq/0,1607,7-135-3313_3682_3716---,00.html
Description: A training manual for stormwater best management practices to be used prior to taking the state examine. Also note a one page order form for the manual is also available as a handout.

☐ **Wastewater handouts –A Homeowners Guide to septic systems** - EPA **- Homeowners Septic system Checklist**	2 or 17 pages 1 page

Website: http://www.epa.gov/npdes/pubs/homeowner_guide_short_version_customize.pdf
http://www.epa.gov/npdes/pubs/homeowner_guide_long_customize.pdf
http://www.epa.gov/npdes/pubs/septic_sticker_customize.pdf
Description: The guide is available in a short 2 page or a 17 page discussion of what septic systems are and how to care for them. There is also a one page checklist summary.

☐ **Wastewater handouts - What Happens After the Flush?** - EPA	4 pages

Website: http://www.epa.gov/npdes/pubs/what_happens_after_the_flush.pdf
Description: A brief description of both septic systems and wastewater treatment plants.

☐ **Wells – Abandoned Wells**	4 pages

Website: http://www.deq.state.mi.us/documents/deq-wd-gws-wcu-pluggingabandonedwells.pdf
Description: This brochure provides guidance on how to locate and plug abandoned wells.

☐ **Well - Your new water well**	8 pages

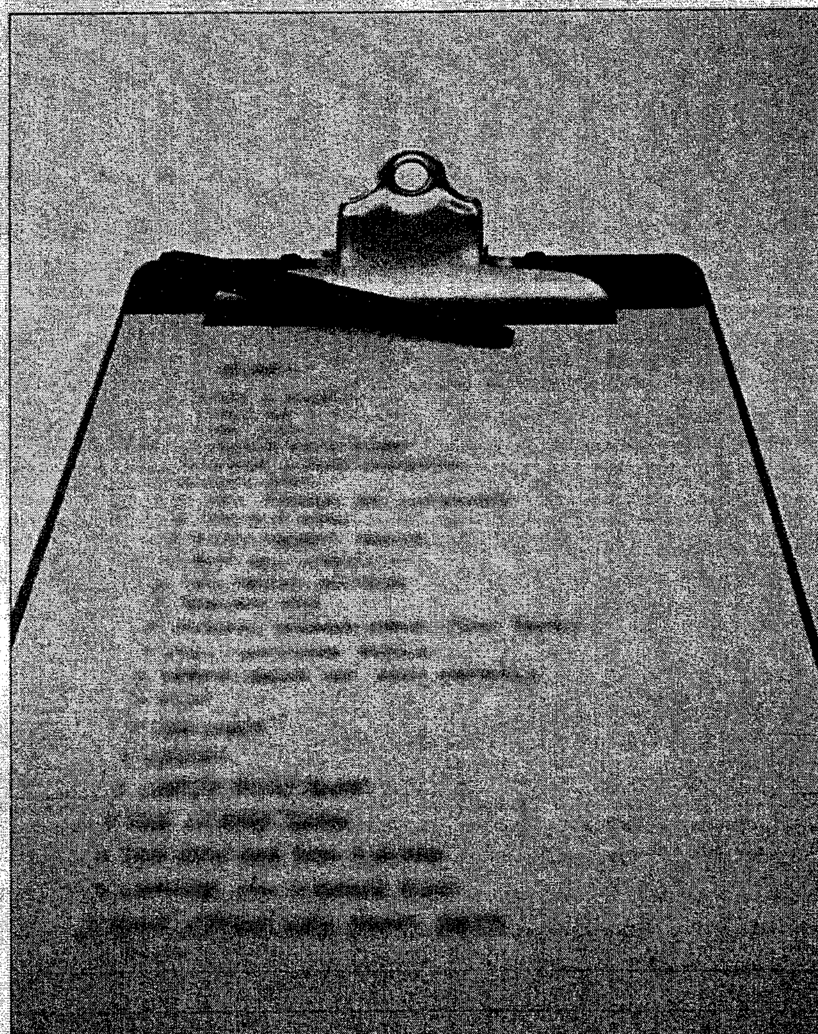
Website: http://www.deq.state.mi.us/documents/deq-ead-tas-wellbroch.pdf
Description: This provides an overview of home wells, the importance of maintenance and the need to protect it from contamination.

☐ **Wetland Information**	NA

Website: www.michigan.gov/deqwetlands
Description: The DEQ website A comprehensive discussion on the subject (147 pages) is the "Living with Wetlands" listed on the right side.

Listing of non-DEQ websites does not imply any endorsement by MDEQ. 03/05

Building **Green** Hospitals CHECKLIST



Canadian health care facilities are a powerful symbol of health and a recognized community leader. It is incompatible with the mission of facilities dedicated to healing to be sources of environmental harm through air and wastewater emissions, hazardous and solid waste generation, toxic chemical usage, green house gas emissions and poor indoor air quality. Many managers of aging Canadian health care facilities are beginning to design new facilities or add on to existing facilities. As health care corporations begin to plan for new facilities or additions, it is an opportune time to include environmental criteria into the usual design drivers of performance, cost, quality, patient and staff safety, cultural, legal and technical criteria.

The intent of the following checklist is to provide guidance to building project teams as members turn their focus towards greening in the design and construction phase of their new project. In short, we encourage considering 'whole system' thinking, front loaded design, end user consideration (staff and patients) and teamwork.

1. CHOOSE AN ENVIRONMENTALLY FRIENDLY SITE

- ☐ Avoid farmland, wetlands, flood plains, environmentally sensitive lands and hazardous substance sites
- ☐ Rehabilitate vacant areas as necessary
- ☐ Share existing parking/transportation infrastructure
- ☐ Minimize heat islands (thermal gradient differences between developed and undeveloped areas)
- ☐ Take advantage of existing transit, water and energy infrastructure in the community
- ☐ Preserve local habitat, greenfields and natural resources

2. DESIGN FOR SUSTAINABILITY & EFFICIENCY

BUILDING

- ☐ Prioritize parks, greenways and bikeways throughout the new hospital area. Plan sufficient shade.
- ☐ Investigate incentives available from the Commercial Buildings Incentive Programme of Natural Resources Canada
- ☐ Consider (re)use of existing buildings including structure, shell, etc.
- ☐ Identify opportunities to incorporate recycled materials into the building, such as beams and posts, flooring, paneling, bricks, doors, frames, cabinetry, furniture, trim, etc.
- ☐ Provide suitable means of securing bicycles with convenient change/shower facilities for those who cycle/jog to work
- ☐ Design for durability - life-cycle costing/value engineering strategy for finishes and systems to reduce waste.
- ☐ Maximize daylighting and view opportunities (building orienta-

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tion, exterior/interior shading devices, high performance glazing, photo-integrated light sensors, shallow floor plates, increased building perimeter, etc.)

- ☐ Designate an area for recyclable collection and storage that is appropriate and convenient with consideration given to using cardboard balers, aluminum can crushers, recycling chutes, and other waste management technologies to enhance recycling programme.
- ☐ Consider the installation of an on-site compost vessel
- ☐ Design for adaptability of building design as user needs change.
- ☐ Establish a project goal for locally sourced materials and identify materials & material suppliers that can help achieve this goal - this reduces environmental impact due to transportation and supports the local economy
- ☐ Provide capacity for indoor air quality (IAQ) monitoring to sustain long-term occupant health and comfort (carbon dioxide sensors integrated into building automation system

ENERGY

- ☐ Orient building to take advantage of solar energy for heating and daylighting, and to encourage natural ventilation and passive cooling
- ☐ Consider heat recovery systems where appropriate
- ☐ Use computer simulation model to assist in maximizing energy performance
- ☐ Install mechanical ventilation equipment
- ☐ Install high efficiency heating and cooling equipment
- ☐ Install a lighting control system
- ☐ Install high efficiency lights, appliances and fixtures with motion/occupancy sensors where appropriate
- ☐ Consider heating/cooling and energy from renewable sources (e.g., solar, wind, biomass, geothermal, bio-gas, etc.)
- ☐ Minimize light pollution by proper and judicious illumination
- ☐ Design the building with equipment to measure water and energy performance

- ☐ Consider task lighting, "opening window" technology, and underfloor HVAC systems with individual diffusers
- ☐ Exceed minimum insulation requirements for walls, ceilings, etc. as prescribed under NRCan's Commercial Buildings Incentive Programme
- ☐ Install and maintain a temperature/humidity monitoring system to automatically adjust to building conditions and link system to building automation system
- ☐ Consider the use of Energy Star and Environmental Choice products wherever possible
- ☐ Deploy a monitoring and tracking system for all energy inputs with scheduled reviews to assure efficiencies are being met

WATER

- ☐ Evaluate safe strategies to recycle waste water/gray water for other purposes on the site
- ☐ Limit disruption of stormwater flows by minimizing runoff, increase on-site infiltration and reduce containments through constructed wetlands, bioswales, etc.
- ☐ Consider collecting storm water run-off for other purposes (irrigation) on the site
- ☐ Consider use of Reverse Osmosis feed water to feed steam boilers in power plant to reduce chemicals required, produce cleaner steam, increase cycles and reduces boiler blowdown to the environment
- ☐ Landscape with drought resistant native plants and perennial ground covers. Situate building to take advantage of existing vegetation.
- ☐ Use low flow taps, nozzles and toilets

EVALUATION

- ☐ Assure that building elements are installed and calibrated properly to meet the project's environmental health goals in addition to mechanical, electrical and plumbing system requirements
- ☐ Perform a two-week building flushout or test contaminant levels in building before occupancy

CHEMICAL/INDOOR AIR QUALITY

- ☐ Avoid ozone-depleting chemicals in mechanical equipment and insulation (Zero-tolerance for CFC-based refrigerant)
- ☐ Avoid materials that will off gas pollutants, solvent-based finishes adhesives, carpeting, and particleboard that release formaldehyde
- ☐ Audit existing building systems using refrigerant and fire suppression chemicals and remove HCFCs and Halons
- ☐ Specify refrigeration/fire suppression systems that use no HCFCs or halons
- ☐ Specify materials free from toxic chemicals and that do not release toxic byproducts throughout their life cycle, those toxins that are carcinogenic, persistent or bioaccummulative. Key materials to avoid include mercury (switching equipment), arsenic (pressure treated wood), urea formaldehyde (engineered wood), PVC (floors,wall coverings, furniture, roof membranes, plumbing pipe, electrical wire) and asbestos
- ☐ Place air intakes away from vehicles and other such sources to prevent indoor air contamination
- ☐ Adopt an Indoor Air Quality (IAQ) management plan to protect the HVAC system during construction, control pollutant sources and interrupt pathways for contamination

WASTE

- ☐ Encourage environmentally responsible forest management by using wood-based materials certified in accordance with the Forest Stewardship Council Guidelines
- ☐ Incorporate materials that are designed for disassembly and recycle/reuse at the end of functional life
- ☐ Ensure adequate space for storage of hazardous waste (e.g., biomedical, chemical, radioactive, etc.)

3. USE GREEN BUILDING MATERIALS & PRODUCTS

- ☐ Minimize the use of carpets and other such materials that have the potential to absorb and release indoor pollutants
- ☐ Use high reflectant roofing
- ☐ Use high performance windows (double glazed, argon, etc.)
- ☐ Use rapidly renewable building materials such as bamboo flooring, wool carpet, strawboard, linoleum, poplar OSB, sunflower seed board, wheatgrass cabinetry, hemp fabrics,etc.
- ☐ Use durable products and materials that require low maintenance

4. THINK GREEN DURING CONSTRUCTION

- ☐ Establish landfill diversion plan for site and building elements (land clearing debris, cardboard, metals, brick, concrete, plastic, clean wood, glass, gypsum wallboard, carpet, insulation) and track efforts to comply with recycling/diversion plan
- ☐ Protect trees and topsoil during site work
- ☐ Centralize cutting operations to reduce job site waste and simplify sorting
- ☐ Minimize construction packaging material or return such waste to suppliers for reuse/recycling
- ☐ Educate and seek feedback from crews, including subcontractors, about the environmental vision and the importance of green design and construction practices

5. KEEP GREENING

- ☐ Establish a waste separation & recycling programme and educate staff as to the benefits
- ☐ Educate and engage staff in all departments in current environmental initiatives and about opportunities to get involved

- ☐ Establish a 'Green Team' of staff from all departments to monitor progress towards environmental goals
- ☐ Draft a Measurement & Verification Plan to compare predicted savings (water, electricity) with those actually achieved once built
- ☐ Create a staff 'Environmental Coordinator' position
- ☐ Phase out the use of chemical pesticides on greenspace in favour of organic horticultural approaches
- ☐ Adopt green procurement protocols to screen all products for environmental benefits and alternatives
- ☐ Develop an Environmental Management system (EMS)
- ☐ Obtain membership in the Natural Resources Canada's Energy Innovators Initiative (EII)
- ☐ Engage in a "green power' contract with a local utility
- ☐ Identify local recyclers/buyers of glass, plastic, organic waste, office paper, cardboard, etc.
- ☐ Identify and support waste haulers/recyclers who share a green philosophy
- ☐ Initiate a policy of purchasing only fairly traded coffee and chocolate products in cafeterias/vending machines
- ☐ Developed a wellness initiative to improve the quality of the employee's work life.

6. RESOURCES

- ☐ American Society of Healthcare Engineering - Green Healthcare Construction Guidance Statement (www.ashe.org/awards/ASHEGreenConstructionGuidance2002.pdf)
- ☐ Building Materials for the Environmentally Hypersensitive - Canada Mortgage and Housing Corporation (www.cmhc-schl.gc.ca)
- ☐ Canadian Coalition for Green Health Care (www.greenhealthcare.ca)
- ☐ Canadian Healthcare Engineering Society (www.ches.org)
- ☐ Health Care Without Harm (www.noharm.org)
- ☐ Healthy Building Network (www.healthybuilding.net)
- ☐ Natural Resources Canada's Dollars to $ense energy management workshops (http://oee.nrcan.gc.ca/workshops)
- ☐ Natural Resources Canada's Energy Innovators Initiative (EII) (www.oee.nrcan.gc.ca/eii)
- ☐ Natural Resources Canada's Commercial Buildings Incentive Programme (CBIP) (http://.oee.nrcan.gc.ca/cbip.htm)

The above is but a sampling of the many initiatives to consider as you move towards Green Health Care. The members of the Canadian Coalition for Green Health Care encourages you to open dialogue and work with all your internal and external stakeholders to move toward a completely Green Hospital.

Prepared on behalf of the Canadian Coalition for Green Health Care. The authors gratefully acknowledge the assistance of the Northumberland Health Care Corporation, Cobourg, Ontario, Health Care Without Harm, and the Canadian Healthcare Engineering Society (CHES).

The Canadian Coalition for Green Health Care
Coalition canadienne pour un système de santé vert

"The Canadian Coalition for Green Health Care - a member of Health Care Without Harm - is committed to encouraging the adoption of resource conservation, pollution prevention principles and effective environmental management systems, without compromising safety and care, so as to protect human health and reduce the Canadian health care system's ecological impact. Building healthy hospitals is key to sustainable health care."

http://www.greenhealthcare.ca

Canadian Centre for Pollution Prevention
Canada's Foremost Pollution Prevention Resource

Healthcare EnviroNet
Affiliated website of
www.c2p2online.com

Healthcare Environet -Promoting Pollution Prevention and Sustainabilty in the Health Care Sector

The purpose of Healthcare EnviroNet, operated by the Canadian Centre for Pollution Prevention, is to provide the health care community with access to environmental information, products, and services that support a commitment to quality health care, protection of the environment, and sustainability.

Energy Resources & Web Links

Green Building Information Links (see also the Green Building Resource List)	
Energy Efficient Builders Association	www.eeba.org
Energy Efficient Buildings	www.eren.doe.gov/EE/buildings.html
Energy Software	www.eren.doe.gov/buildings/tools_directory/
Green Building News by Oikos	www.oikos.com
Housing Technology Innovation	www.pathnet.org
US Green Building Council	www.usgbc.org
Home Energy Information Links	
Consumer Energy Savers - DOE	www.eere.energy.gov/consumerinfo/
Consumer Guide to Energy Savings	www.aceee.org/consumerguide/index.htm
Energy Efficiency Checkups for Home and Business	www.ase.org/checkup/
Energy Efficient Renewable Home - Wisconsin	www.focusonenergy.com/data/common/pageBuilderFiles/EER%20home_951945016.pdf
Energy Star for Homes & Businesses	www.energystar.gov
Energy Star Labeled Products	www.energystar.gov/products/
Enviro House – Recycle Ann Arbor	http://www.environmentalhouse.org/
Guide to Michigan's Energy Product and Service Providers	http://urbanoptions.org/MBEE/guide/ (no www)
Home Energy Saver	http://homeenergysaver.lbl.gov/ (no www)
Home Energy Advisor	http://advisor.lbl.gov/hit/Controller
Tips on Saving Energy & Money at Home	www.pueblo.gsa.gov/cic_text/housing/energy-savers/energy_savers.html?cart=01E25ilq.nnt&lpg=%2Fcic%5Fshop%2Fhousing%2Etam&lpt=990798713
Industrial Assessment Services	
Mi Manufacturing Technology Center	www.iti.org
RETAP – Retired Engineers Technical Assistance Program	http://www.michigan.gov/deq/0,1607,7-135-3307_3668_4848---,00.html
Manufacturers & Business Energy Information Links	
Energy Efficiency for Home & Business	www.ase.org/checkup/
Energy Star for Homes & Businesses	www.energystar.gov
Energy Star Labeled Products	www.energystar.gov/products/
Guide to Industrial Assessments for Pollution Prevention and Energy Efficiency USEPA, 625/R-99/003 2001	www.epa.gov/ordntrnt/ORD/NRMRL/Pubs/2001/energy/complete.pdf
Guide to Michigan's Energy Product and Service Providers	http://urbanoptions.org/MBEE/guide/ (no www)
Michigan Businesses for Energy Efficiency	www.urbanoptions.org/MBEE/
Michigan's CIS Energy Office	http://www.michigan.gov/cis/0,1607,7-154-25676---,00.html
National Association of Manufacturers Energy Efficiency Toolkit	www.nam.org/secondary.asp?trackID=&CategoryID=295
Office of Industrial Technologies	www.oit.doe.gov/clearinghouse/

Clearinghouse	
Renewable Energy Information	
American Solar Energy Society	www.ases.org/
Canadian Sustainable Energy Systems	www.newenergy.org/
Center for Renewable Energy and Sustainable Technology	www.crest.org/index.html
Energy Efficiency and Renewable Energy Network – financing & solar	www.eren.doe.gov/financing/ http://www.eren.doe.gov/RE/solar.html
Energy ideas	www.energyideas.org/
EPA Clean Energy	http://www.epa.gov/cleanenergy/renew.htm
Great Lakes Renewable Energy Assoc. Interstate Renewable Energy Council	http://glrea.org/ (no www) www.irecusa.org
Green Power Market Development	www.thegreenpowergroup.org
Miscellaneous Information Sources	
Alliance to Save Energy	www.ase.org
Alternative Fuel Vehicles	www.afdc.doe.gov
American Council for an Energy-Efficient Economy	www.aceee.org/
Berkeley – Environmental Energy Technologies Division	http://eande.lbl.gov (no www)
Center for the Analysis & Dissemination of Demonstrated Energy Technologies	www.caddet-ee.org
Dept of Energy's Home Page	www.energy.gov/
Dept of Energy's Center for Sustainable Development	www.sustainable.doe.gov
Energy Efficiency Factsheets	www.eren.doe.gov/consumerinfo/
Energy Information Administration	www.eia.doe.gov
EPA Energy Star	www.energystar.gov/
Financing Toolbox for Energy Efficiency and Pollution Prevention (241 pages)	www.eere.energy.gov/industry/financial/fin_toolbook.html
Michigan's Energy Office, Dept of Consumer & Industry Services	www.michigan.gov/cis/0,1607,7-154-25676---,00.html
Michigan Dept Environmental Quality's Energy Efficiency resources	www.michigan.gov/deq/0,1607,7-135-3585_30068_27504---,00.html
Michigan Public Service Commission & Restructuring	www.cis.state.mi.us/mpsc/electric/restruct
Midwest Energy Efficiency Alliance	www.mwalliance.org/
Sustainable Communities Network	www.sustainable.org
Tellus Institute	www.tellus.org
Urban Options	www.urbanoptions.org/pages/links.htm
Other Relevant Resource Lists	
Resource Lists: General P2; Green Building; Recycling and Sustainability	
	06/04
Want to add resources to a list? Contact Maggie Fields, MDEQ, fieldsm@michigan.gov 517-335-6250	
Listing of these websites does not imply any endorsement by MDEQ.	

SIEMENS

News Release

FOR IMMEDIATE RELEASE

CONTACT: Molly Grasso
Siemens Medical Solutions
(610) 448-4729
molly.grasso@siemens.com

SIEMENS TEAMS UP WITH CINCINNATI CHILDREN'S TO DELIVER PEDIATRIC CLINICAL CONTENT
Siemens To Market CCHMC's Award-Winning Pediatric Order Sets

MALVERN, Pa., February 23, 2004 – Siemens Medical Solutions announces that it has expanded its partnership with Cincinnati Children's Hospital Medical Center (CCHMC), one of the nation's leading pediatric care providers, to incorporate CCHMC's Computerized Physician Order Entry (CPOE) pediatric order sets into Siemens CPOE offerings.

As a result of the agreement, Siemens has purchased CCHMC's pediatric order sets, clinical pathways, care plans, and dose checking rules and references, and is using this content as the foundation for pediatric CPOE starter sets that will be used by other Siemens customers. Siemens will offer CCHMC's pediatric order sets with both its INVISION® and Soarian® CPOE offerings.

The agreement will enable Siemens customers to leverage the substantial benefits that CCHMC, a 2003 HIMSS Nicholas E. Davies award winner, has already achieved with these order sets. Using Siemens INVISION as the core to its enterprise-wide integrated clinical information system that provides advanced, pediatric-specific clinical decision support tools, CCHMC has seen clinical outcome improvements including elimination of transcription errors in medication orders, a 35 percent reduction in medication errors, and a 52 percent improvement in medication turnaround times.

"We are delighted to expand our clinical offerings with thoroughly tested pediatric order sets from this well-respected provider," said Tom Miller, president, IT Division, Siemens Medical Solutions. "Siemens and CCHMC have had a robust, productive relationship since 1995 and we look forward to helping other providers achieve similar patient safety outcomes. CCHMC is a shining example of the impact that successful clinical workflow redesign can have on an organization."

- more -

According to Brian Jacobs, M.D., professor of clinical pediatrics and director of technology and patient safety at CCHMC, "Cincinnati Children's has long been recognized for clinical excellence in the pediatric arena, and now we are pleased to share our knowledge via this cooperative venture with Siemens. Combining information technology with process reengineering continues to help us meet our strategic objectives such as optimizing patient safety and consistency of care, and we hope this arrangement with Siemens helps enable other clinicians to determine the most effective and safe treatment options for children."

CCHMC is a 423-bed freestanding children's hospital with more than 700,000 patient encounters in fiscal year 2004 from children and families throughout the world. For its pioneering work in CPOE and clinical documentation solutions, Cincinnati Children's was honored with the 2003 Nicholas E. Davies EMR (electronic medical record) Recognition Program Award of Excellence sponsored by the Healthcare Information and Management Systems Society (HIMSS), becoming the first children's hospital to win this prestigious award. CCHMC is also the only pediatric center to receive the *Pursuing Perfection Grant* from the Robert Wood Johnson Foundation in 2001. The Cincinnati Children's Research Foundation ranks third nationally among all pediatric centers in research grants from the National Institutes of Health. Additional information about Cincinnati Children's can be found at www.cincinnatichildrens.org.

Siemens Medical Solutions of Siemens AG (NYSE: SI) with headquarters in Malvern, Pennsylvania and Erlangen, Germany, is one of the largest suppliers to the healthcare industry in the world. The company is known for bringing together innovative medical technologies, healthcare information systems, management consulting, and support services, to help customers achieve tangible, sustainable, clinical and financial outcomes. Employing approximately 31,000 people worldwide and operating in more than 120 countries, Siemens Medical Solutions reported sales of 7.07 billion EUR, orders of 8.12 billion EUR and group profit of 1.05 billion EUR for fiscal 2004. More information can be obtained by visiting http://www.usa.siemens.com/medical-pressroom.

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Green Building Resources

B. 9

DEQ RESOURCES	
DEQ Documents	
Manufacturers' Guide to Environmental Safety and Health Regulations (2002)	www.michigan.gov/deq/0,1607,7-135-3307_3668_4148-15820--,00.html
DEQ Websites	
Construction & Deconstruction	www.michigan.gov/deq/0,1607,7-135-3585_4130-12590--,00.html
Financial Assistance	www.michigan.gov/deq/0,1607,7-135-3307_3515---,00.html
FEDERAL RESOURCES	
Federal Documents	
Building Savings EPA-530-F-00-001 June 2000	www.ilsr.org/recycling/buildingdebris.pdf
Green Building: A Primer for Builders, Consumers & Realtors	www.sustainable.doe.gov/buildings/gbarttoc.shtml
Federal Websites	
Building Resources - EPA	www.epa.gov/wastewise/wrr/cbres.htm
Database of Construction Recyclers	http://cwm.gsa.gov/ (no www)
Energy Software	www.eren.doe.gov/buildings/tools_directory/
Energy Star	www.energystar.gov
Federal Energy Mngmt Program	www.eren.doe.gov/femp/
Green Buildings & Materials	www.epa.gov/greenbuilding/
Indoor Air Quality	www.epa.gov/iaq
Office of Building Technology -DOE	www.eren.doe.gov/buildings/ Info for homeowners, commercial, designers, research, etc
Procurement Guidelines – Recycled Content (products and suppliers)	www.epa.gov/cpg
Smart Communities – Green Building	www.sustainable.doe.gov/
Sustainable Design-GSA	http://www.gsa.gov/Portal/gsa/ep/home.do?tabId=1
Sustainable Design Program –DOE	www.pnl.gov/doesustainabledesign/ Software - Environmental Design Guide for Engineers
OTHER RESOURCES	
Other Documents	
Contract Language for environmental construction – DOE	www.pnl.gov/doesustainabledesign/ Choose Tools & Resources
Designing With Vision: A Technical Manual For Material Choices In Sustainable Construction	www.ciwmb.ca.gov/GreenBuilding/Pubs.htm
Green Building Guidelines - Federal	www.wbdg.org/design/greenspec.php
Green Building Guidelines - NY	http://wings.buffalo.edu/ubgreen/leos/ubhpguidelines.pdf
Green Building Guidelines - SBIC	www.sbicouncil.org/home/index.html

Handbook of Sustainable Building	www.jxj.com/catofpub/handbook_sustainable_building.html
Sustainable Building Sourcebook	www.greenbuilder.com/sourcebook/
Green Building Supplier lists	www.edcmag.com/FILES/HTML/EDC_buyers_guide/0,5145,,00.html
Other Websites	
Austin's Green Building program	www.ci.austin.tx.us/greenbuilder/
BEES (**B**uilding for **E**nvironmental and **E**conomic **S**ustainability)	www.bfrl.nist.gov/oae/software/bees.html software
Builders Guide (Northwest)	www.nwbuildnet.com/nwbn/environmental.html
Build Recycle.Net Mat'l Exchanges	http://build.recycle.net/index.html (no www)
Built Green – Colorado's Criteria	www.builtgreen.net
Congress for New Urbanism	www.cnu.org/index.cfm
En-house–Green Building Demo	http://www.environmentalhouse.org/
Global Green Building Initiative	www.globalgreen.org/
Green Building Alliance	www.gbapgh.org/
Green Building Manual - PPRC	www.pprc.org/pprc/pubs/topics/greencon/toc.html
Green Spec – Building Products	www.greenspec.com/
King County Const Matls	www.metrokc.gov/procure/green/const.htm
Library for Green Building	www.wmrc.uiuc.edu/library/libraryinfo/refguides/greenbuilding.htm
Max Potential Building Systems	www.greenbuilder.com
Nat'l Assoc of Home Builders	www.nahbrc.com/
Northwest EcoBuilding Guild	www.ecobuilding.org/cal/
Oikos Green Product Info	www.oikos.com/products
P2 & Residential Construction - Peaks to Prairie	http://peakstoprairies.org/topichub/toc.cfm?hub=31&subsec=7&nav=7 (no www)
Recycled Materials Resource Center	www.rmrc.unh.edu
Resourceful Building Technology	www.crbt.org/index.html - use the e-guide
Rocky Mountain Institute - Buildings	www.rmi.org/sitepages/pid13.php
Rocky Mountain Institute - Energy	www.greendesign.net/rmi/heb/index.html
Sustainable Bldgs Industry Council	www.sbicouncil.org/home/index.html
Sustainable Building Source Book	www.greenbuilder.com/sourcebook/ (Austin, Tx)
Sustainable Design Resource Guide	www.aiacolorado.org/SDRG/index.html
Sustainable Resource Guide - Seattle	www.cityofseattle.net/light/conserve/sustainability/resource/
US Green Building Council (LEED)	www.usgbc.org/

PERIODICALS/NEWS/ASSOCIATIONS

Construction Matls Recycling Assoc.	www.cdrecycling.org/
Energy & Environmental Building Assoc	www.eeba.org/
Environmental Building News	www.buildinggreen.com/
Environmental Design & Construction	www.edcmag.com/
Green Building News & e-list OIKOS	www.oikos.com/
Green Clips List Serve	www.greendesign.net/greenclips/
International Interior Design Association	www.iida.org
Resource Recycling Magazine	www.resource-recycling.com
Used Building Materials Association	http://bcn.boulder.co.us/environment/ubma/index.html (no www)

Other Relevant Resource Lists

Resource Lists: Building Matls Recycling-for recycling construction waste issues; Energy; and Recycling

Want to add resources to a list? Contact Maggie Fields, MDEQ, fieldsm@michigan.gov 517-335-6250

Listing of these websites does not imply any endorsement by MDEQ.	05/04
Green Building Examples	
Herman Miller Market Place	http://hpb.buildinggreen.com/reports/project_189/project_189_2.pdf
High Performance Buildings - EERE	http://www.eere.energy.gov/buildings/highperformance
King County – Center	http://dnr.metrokc.gov/dnrp/ksc_tour/index.htm
Univ of Mi - Greening of Dana	www.snre.umich.edu/greendana/

Environmental Building News' Checklist for Environmentally Responsible Design & Construction

DESIGN

• ***Smaller is better:*** Optimize use of interior space through careful design so that the overall building size—and resource use in constructing and operating it—are kept to a minimum.

• ***Design an energy-efficient building:*** Use high levels of insulation, high-performance windows, and tight construction. In southern climates, choose glazings with low solar heat gain.

• ***Design buildings to use renewable energy:*** Passive solar heating, daylighting, and natural cooling can be incorporated cost-effectively into most buildings. Also consider solar water heating and photovoltaics—or design buildings for future solar installations.

• ***Optimize material use:*** Minimize waste by designing for standard ceiling heights and building dimensions. Avoid waste from structural over-design (use optimum-value engineering / advanced framing). Simplify building geometry.

• ***Design water-efficient, low-maintenance landscaping:*** Conventional lawns have a high impact because of water use, pesticide use, and pollution generated from mowing. Landscape with drought-resistant native plants and perennial groundcovers.

• ***Make it easy for occupants to recycle waste:*** Make provisions for storage and processing of recyclables—recycling bins near the kitchen, undersink compost receptacles, and the like.

• ***Look into the feasibility of graywater:*** Water from sinks, showers, or clothes washers (graywater) can be recycled for irrigation in some areas. If current codes prevent graywater recycling, consider designing the plumbing for easy future adaptation.

• ***Design for durability:*** To spread the environmental impacts of building over as long a period as possible, the structure must be durable. A building with a durable style ("timeless architecture") will be more likely to realize a long life.

• ***Design for future reuse and adaptability:*** Make the structure adaptable to other uses, and choose materials and components that can be reused or recycled.

• ***Avoid potential health hazards—radon, mold, pesticides:*** Follow recommended practices to minimize radon entry into the building and provide for future mitigation if necessary. Provide detailing to avoid moisture problems, which could cause mold and mildew growth. Design insect-resistant detailing to minimize pesticide use.

LAND USE & SITE ISSUES

• ***Renovate older buildings:*** Conscientiously renovating existing buildings is the most sustainable construction.

• ***Create community:*** Development patterns can either inhibit or contribute to the establishment of strong communities and neighborhoods. Creation of cohesive communities should be a high priority.

• ***Encourage in-fill and mixed-use development:*** In-fill development that increases density is inherently better than building on undeveloped (greenfield) sites. Mixed-use development, in which residential and commercial uses are intermingled, can reduce automobile use and help to create healthy communities.

• ***Minimize automobile dependence:*** Locate buildings to provide access to public transportation, bicycle paths, and walking access to basic services. Commuting can also be reduced by working at home—consider home office needs with layout and wiring.

• ***Value site resources:*** Early in the siting process carry out a careful site evaluation: solar access, soils, vegetation, water resources, important natural areas, etc., and let this information guide the design.

• ***Locate buildings to minimize impact:*** Cluster buildings to preserve open space and wildlife corridors. Avoid especially sensitive areas including wetlands, and keep roads and service lines short. Leave the most pristine areas untouched, and build on areas that have been previously degraded. Seek to restore damaged ecosystems.

• ***Provide responsible on-site water management:*** Design landscapes to absorb stormwater instead of putting in storm sewers to carry it off-site. Consider rooftop water catchment systems so that rainwater can be used for potable needs and landscape irrigation.

• ***Situate buildings to benefit from existing vegetation:*** Trees on the east and west sides of a building can dramatically reduce cooling loads. Hedge rows and shrubbery can block cold winter winds or help channel cool summer breezes into buildings.

• ***Protect trees and topsoil during sitework:*** Protect trees from construction damage by fencing off the "drip line" around them and avoiding major changes to surface grade.

• ***Avoid use of pesticides and other chemicals that may leach into the groundwater:*** Look into less toxic termite treatments, and keep exposed frost walls free from obstructions to discourage insects. When backfilling a foundation or grading around a house, do not bury any construction debris.

MATERIALS

• ***Use durable products and materials:*** Because manufacturing is very energy-intensive, a product that lasts longer or requires less maintenance usually saves energy. Durable products also contribute less to our solid waste problems.

• ***Choose low-maintenance building materials:*** Where possible, select building materials that require little maintenance (painting, retreatment, waterproofing, etc.), or whose maintenance will have minimal environmental impact.

• ***Choose building materials with low embodied energy:*** Heavily processed or manufactured products and materials are usually more energy intensive. As long as durability and performance will not be sacrificed, choose low-embodied-energy materials.

• ***Buy locally produced building materials:*** Transportation is costly in both energy use and pollution generation. Look for locally produced materials. Local hardwoods, for example, are preferable to tropical woods.

• ***Use building products made from recycled materials:*** Building products made from recycled materials reduce solid waste problems, cut energy consumption in manufacturing, and save on natural resource use. A few examples of materials with recycled content are cellulose insulation, Homasote®, Thermo-ply®, floor tile made from ground glass, and recycled plastic lumber.

• ***Use salvaged building materials when possible:*** Reduce landfill pressure and save natural resources by using salvaged materials: lumber, millwork, certain plumbing fixtures, and hardware, for example. Make sure these materials are safe (test for lead paint and asbestos), and don't sacrifice energy efficiency or water efficiency by reusing old windows or toilets.

• ***Seek responsible wood supplies:*** Use lumber from independently certified well-managed forests. Avoid lumber products produced from old-growth timber unless they are certified. Engineered wood can be substituted for old-growth Douglas fir, for example. Don't buy tropical hardwoods unless the seller can document that the wood comes from well-managed forests.

• ***Avoid materials that will offgas pollutants:*** Solvent-based finishes, adhesives, carpeting, particleboard, and many other building products release formaldehyde and volatile organic compounds (VOCs) into the air; these chemicals can affect workers' and occupants' health as well as contribute to smog and ground-level ozone pollution outside. Avoid materials that offgas HCFCs, such as extruded polystyrene and polyisocyanurate foam insulation.

• ***Minimize use of pressure-treated lumber:*** Use detailing that will prevent soil contact and rot. Where possible, use alternatives such as recycled plastic lumber. Take measures to protect workers when cutting and handling pressure-treated wood. Scraps should never be incinerated.

• ***Minimize packaging waste:*** Avoid excessive packaging, such as plastic-wrapped plumbing fixtures or fasteners unavailable in bulk. Tell suppliers why you are avoiding over-packaged products. (Some products must be carefully packaged to prevent damage—and resulting waste.)

EQUIPMENT

• ***Install high-efficiency heating and cooling equipment:*** Well-designed high-efficiency furnaces, boilers, and air conditioners (and distribution systems) not only save building occupants money, but also produce less pollution. Install equipment with minimal risk of combustion gas spillage, such as sealed-combustion appliances.

• ***Avoid ozone-depleting chemicals in mechanical equipment and insulation:*** CFCs have been phased out, but their primary replacements—HCFCs—also damage the ozone layer and should be avoided where possible. Reclaim CFCs when servicing or disposing of equipment.

• ***Install high-efficiency lights and appliances:*** Fluorescent lighting has improved dramatically in recent years and is now suitable for homes. High-efficiency appliances offer both economic and environmental advantages over their conventional counterparts.

• ***Install water-efficient equipment:*** Water-conserving toilets, showerheads, and faucet aerators reduce water use as well as the demand on septic systems or sewage treatment plants. Reducing hot water use also saves energy.

• ***Install mechanical ventilation equipment:*** Mechanical ventilation is usually required to ensure healthy indoor air. Heat recovery ventilators should be considered in cold climates for energy savings, but simpler, less expensive exhaust-only ventilation systems are also adequate.

BUSINESS PRACTICES

• ***Minimize job-site waste:*** Centralize cutting operations to reduce waste and simplify sorting. Set up clearly marked bins for different types of usable waste (wood scraps for kindling, sawdust for compost, etc.). Find out where various materials can be taken for recycling, and educate your crew about recycling procedures. Donate salvaged materials to low-income housing projects, theater groups, etc.

• ***Make your business operations more environmentally responsible:*** Plan transportation to be as efficient as possible —purchase energy-efficient vehicles, arrange carpools to job sites, and schedule site visits and errands to minimize driving. In your office, purchase recycled paper and supplies, recycle office paper, use mugs instead of disposable cups. On the job, recycle beverage containers.

• ***Make education a part of your daily practice:*** Use the design and construction process to educate clients, employees, subcontractors, and the general public about environmental impacts of buildings and how these impacts can be minimized.

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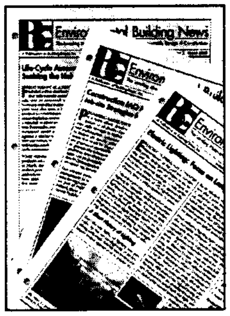

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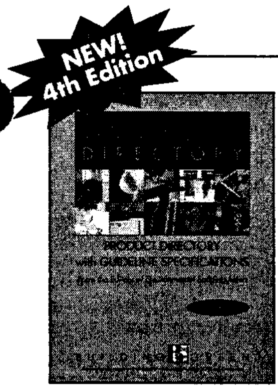

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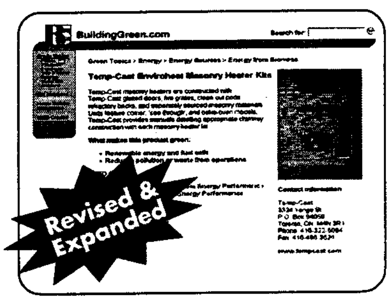

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Please see other side for information on more green building resources.

Recommendations for Infection Control Risk Assessment and Control During Construction and Renovation in Healthcare facilities.

II. Construction, Renovation, Remediation, Repair, and Demolition

A. Establish a multidisciplinary team that includes infection-control staff to coordinate demolition, construction, and renovation projects and consider proactive preventive measures at the inception; produce and maintain summary statements of the team's activities (*1,9,11--16,38,48--51*). Category IB, IC (AIA: 5.1)

B. Educate both the construction team and health-care staff in immunocompromised patient-care areas regarding the airborne infection risks associated with construction projects, dispersal of fungal spores during such activities, and methods to control the dissemination of fungal spores (*11--16,27,50,52--56*). Category IB

C. Incorporate mandatory adherence agreements for infection control into construction contracts, with penalties for noncompliance and mechanisms to ensure timely correction of problems (*1,11,13--16,27,50*). Category IC (AIA: 5.1)

D. Establish and maintain surveillance for airborne environmental disease (e.g., aspergillosis) as appropriate during construction, renovation, repair, and demolition activities to ensure the health and safety of immunocompromised patients (*27,57--59*). Category IB

1. Using active surveillance, monitor for airborne infections in immunocompromised patients (*27,37,57,58*). Category IB
2. Periodically review the facility's microbiologic, histopathologic, and postmortem data to identify additional cases (*27,37,57,58*). Category IB
3. If cases of aspergillosis or other health-care--associated airborne fungal infections occur, aggressively pursue the diagnosis with tissue biopsies and cultures as feasible (*11,13--16,27,50,57--59*). Category IB

E. Implement infection-control measures relevant to construction, renovation, maintenance, demolition, and repair (*1,16,49,50,60*). Category IB, IC (AIA: 5.1, 5.2)

1. Before the project gets under way, perform an ICRA to define the scope of the activity and the need for barrier measures (*1,11,13--16,48--51,60*). Category IB, IC (AIA: 5.1)

   a. Determine if immunocompromised patients may be at risk for exposure to fungal spores from dust generated during the project (*13--16,48,51*).
   b. Develop a contingency plan to prevent such exposures (*13--16,48,51*).

2. Implement infection-control measures for external demolition and construction

Practices: Integrating Green Principles into the Design Process

1) Integrated Design

Vision statement
Achieving an effective sustainable design requires a collaborative process engaging the multiple design disciplines, as well as users, construction managers, contractors and facility managers. The merging of ideas, perspectives and areas of expertise facilitated by an open communications process reaps multiple benefits, as the project team moves from the optimization of single systems in isolation to the optimization of the entire building enterprise. Establishing vertical support throughout the organization helps ensure success.

Goals
- Enhance cost-effectiveness by recognizing interrelationships between systems
- Enhance building performance by integrating design elements
- Encourage cross-disciplinary problem-solving
- Build support among key constituencies for sustainable design

Suggested Strategies
- Develop an environmental health vision statement for the project
- Reinforce corporate/institutional commitments to environmental health and community responsibility.
- Use cross discipline design, decision making, and charettes
- Use goal setting workshops and build a team approach
- Engage owner, staff, contractors, user groups and community groups, educating them on the benefits of green design and bringing them in to the design process
- Use computer-modeling tools such as DOE-2, Energy 10, Radiance to optimize the interactions of different elements (e.g., orientation, insulation, HVAC sizing)

2) Site Design

Vision Statement
The introduction of a building to a site inevitably causes disruptions that affect the health of the local ecosystem. Good site design recognizes the ecological integrity of a site, whether it be a brownfield or a greenfield, and pursues strategies that minimize disruptions such as erosion and habitat displacement and, better, contribute to site restoration. Understanding the building as a series of flows enables the physical structure to achieve a good fit. Site location should reflect a consideration to lessen the ripple effect of the building on the surrounding community by enabling easy access by healthy transportation modes such as walking, bicycling and mass transit.

Goals
- Maintain and restore site biodiversity
- Minimize site development footprint
- Reduce storm water run-off
- Eliminate toxic chemical application for pest and vegetative control
- Optimize design for the local micro-climate and reduce dependence on mechanical systems for building operations
- Reduce reliance on single-occupancy vehicles
- Integrate design and orient building to take advantage of local micro-climate for heating, cooling, shading, ventilation and daylighting *(See also Energy)*
- Eliminate light trespass from the building site, improve night sky access, and reduce development impact on nocturnal environments

Suggested Strategies

- Evaluate brownfield sites to determine appropriate reuse for health care facilities
- Reuse and renovate existing buildings
- Site buildings in urban areas with existing infrastructure
- Avoid agricultural land, 100 year flood plains, threatened or endangered species habitat, wildlife corridors, wetlands
- Orient buildings to make best use of solar energy for heating or daylighting
- Orient buildings to encourage natural ventilation and passive cooling
- Design to reduce erosion and run off into sewer systems and/or air pollution
- Reduce building footprint, optimize layouts and reduce size of roads, parking and other site improvements to concentrate and limit total paving and other site disturbance
- Minimize impervious cover by using open-grid and pervious paving materials
- Maximize preservation and restoration of biodiverse open space/habitat
- Use native trees, shrubs and plants
- Develop and implement an integrated pest management plan
- Use vegetative and other shading techniques to assist passive cooling and ventilation of buildings and public and paved areas
- Site in proximity to transit options
- Establish a transportation plan. Support alternatives to fossil fueled single occupancy vehicles (preferred van/carpool parking, bike parking and changing facilities, electric car charging and other alternate vehicle fueling, nearby transit access). Reduce paved parking area appropriately.
- Design in accordance with Illuminating Engineering Society of North America (IESNA) footcandle requirements as stated in the Recommended Practice Manual: *Lighting for Exterior Environments*, and design interior and exterior lighting such that zero direct beam illumination leaves the building site.

(See Water and Energy for more site design issues)

3) Water

Vision Statement

Water efficient design strategies balance water quality and quantity demands within a building and are responsive to the watershed's capacity as source and sink. Public works projects, such as treatment plants and sewage systems, are unable to adequately remove or process the toxic materials that infiltrate these systems, potentially threatening public health. Take a systematic look to identify potential water sources, how water is used in the building and how it flows around the building site to reduce water usage and wastewater discharges.

Goals

- Minimize the use of potable water while conserving water quality and availability
- Minimize off site treatment of wastewater
- Minimize storm water release from the site
- Maximize use of on-site water resources, (e.g., rainwater, greywater)
- Match water quality with end use requirements
- Maximize aquifer recharge

Suggested Strategies

- Specify EPA Energy Star and high performance fixtures and equipment: e.g., low flow and pressure assist toilets and urinals; waterless urinals; low-flow showerheads and faucets; automatic use activation on sinks, toilets and urinals; Energy Star dishwashers and laundry equipment; ozone-injected laundry equipment
- Maximize water conservation in cooling towers by using non-potable site recycled water for cooling tower makeup, or use non-evaporative condenser heat rejection equipment (air cooled, or ground source)
- Specify native plants that are tolerant of local climate, soils and water

- Install drip irrigation and high efficiency irrigation control (moisture sensors, weather based controllers)
- Implement appropriate, safe strategies to recycle site waste water (e.g. gray water or condensate) and/or municipal secondary treated water for irrigation, sewage conveyance, and toilet flushing
- Collect storm water runoff from roofs and site and use for irrigation, sewage conveyance, toilet flushing and/or HVAC/process makeup water or recharge in to aquifer
- Minimize hardscapes and install permeable paving and other pervious surface materials
- Create wetlands or other systems to locally recharge underground water flows

(Operations & Maintenance Section for additional Water issues)

4) Energy

Vision Statement

The burning of fossil fuels is the single largest contributor to global climate change, as well as a contributor to a host of toxic emissions that impair the environmental health of directly affected communities and the world. Rising energy prices impose a significant economic imperative that requires a careful examination of understanding how to best assure a comfortable healthy indoor environment supportive of patient recovery with a significantly reduced energy demand. Take a comprehensive, systematic look at the building and site's energy flows to reduce energy bills, evaluate opportunities for reliance on renewable energy sources, and improve environmental health outcomes.

Goals

- Reduce building energy demand
- Reduce emissions from energy use
- Reduce reliance on energy generated by fossil fuels
- Maximize use of energy generated by renewable sources

Suggested Strategies

- Use ASHRAE 90.1-1999 as basis of design to optimize thermal envelope performance and evaluate and document opportunities to exceed
- Use energy simulation tools, such as DOE2, Energy 10, Radiance, to optimize interactions between building elements and optimize design
- Optimize layout and orientation of building to optimize energy performance
- Design for appropriate daylighting strategies that reduce heat gain and control glare and contrast
- Specify efficient lighting fixtures
- Specify user controls and ambient condition lighting controls integrated with daylighting
- Specify efficient HVAC equipment (high efficiency, appropriately sized, low NOX)
- Specify EPA Energy Star electrical equipment and appliances
- Specify solar water heating and low-flow hot water fixtures and appliances
- Specify zoning and controls for mechanical equipment to optimize use
- Specify EPA Energy Star™ roofing materials and/or green roofs to reduce cooling loads and heat island effect
- Develop a commissioning plan and hire an independent Commissioning Agent (*See also Commissioning Section)*
- Specify HVAC, refrigeration & fire suppression equipment that do not utilize CFCs and halons. When reusing existing base building HVAC equipment, develop a comprehensive CFC phaseout conversion. Balance ozone depletion potential (ODP) of HCFC alternatives with global warming potential (GWP) *(Refer to Materials Section for further guidance concerning considerations on materials to avoid in energy related equipment and design).*
- Evaluate feasibility for and specify cogeneration, fuel cells, renewable energy systems (such as photovoltaics, wind, biomass and low impact hydroelectric) and other alternative energy sources
- Design for continued monitoring and verification of system performance

- Purchase green energy where available that meets the Center for Resource Solutions Green-e products certification requirements.

(See Site for transportation and climatic design issues)

5) Indoor Environmental Quality

Vision Statement

Growing awareness about the relationship between indoor environmental quality -- materials, lighting, thermal comfort -- and human health and productivity has catalyzed substantial research to support healthier buildings. Eliminating materials identified as allergens, mutagens, carcinogens and endocrine disruptors, while providing access to daylight and comfortable indoor climate, are fundamental green building elements. Engage in a design process that balances the objectives of a well daylit, comfortable, energy efficient and non-toxic indoor environment and results in improved productivity and patient outcomes.

Goals

- Provide an environment for occupants that is healthy and encourages rapid patient recovery and staff productivity
- Minimize production and distribution of pollutants
- Provide occupants with access to daylight and views
- Provide energy efficient thermal comfort
- Provide occupant environmental controls (light, view, thermal, ventilation)
- Provide appropriate air changes with sufficient percentage of fresh air

Suggested Strategies

- Ensure high quality indoor air by meeting or exceeding ASHRAE 62-1999 as a basis of design
- Ensure thermal comfort by meeting or exceeding ASHRAE 55-1992 as a basis of design
- Specify low VOC / low toxic finishes and materials, such as Green Seal-certified paints; composite wood and agrifiber products with no added urea-formaldehyde resins; carpet systems certified by Carpet & Rug Institute Green Label Program; adhesives meeting South Coast Air Quality Management District guidelines; flooring, ceiling wall covering, paints and other interior finishes and materials meeting Washington State indoor air quality guidelines
- Minimize use of carpets and other materials that attract, absorb and re-release indoor pollutants
- Specify permeable wall covering and other materials to prevent trapping of water and microbial growth
- Establish green housekeeping protocols (*See Operations & Maintenance section*)
- Design to reduce pest infestation opportunities
- Install permanent entryway systems (e.g., grates) to trap dirt and particulates
- Position air intakes to prevent contamination from vehicle exhaust and other sources paying attention to prevailing winds
- Assure easy access to inspect and clean filters and ductwork in each straight run
- Ventilate enclosed parking areas and other source areas (smoking areas, housekeeping, copying rooms, hazardous waste)
- If building cannot be 100% non smoking, provide total environmental separation for non smokers and assure no feed in to ventilation system
- Provide building occupants access to daylight, views and operable windows where appropriate
- Provide user controls for airflow, temperature, light (integrated with daylighting - see also Energy section)
- Provide carbon dioxide monitoring system to provide feedback on space ventilation performance
- Specify materials, products, mechanical systems and design features to attenuate sound and vibration, and not to exceed Room Criteria (RC) ratings listed for Hospital and Clinics in Table 34 of Chapter 46, Sound and Vibration Control, 1999 ASHRAE Application Handbook

(See also Operations and Maintenance)

6) Materials & Products

Vision statement

Use of sustainable materials can significantly enhance a building's environmental health performance. The sustainable harvest of materials enhances the health of habitats and increases biodiversity. The Memorandum of Understanding between the US EPA and AHA establishes minimizing production of persistent and bioaccumulative toxics (PBTs) and reducing waste as priorities for the health care industry. Review material specifications to eliminate those that contribute to harmful health affects.

Goals

- Reduce resource depletion
- Reduce embodied energy
- Reduce toxics generated throughout the life cycle of materials
- Reduce waste
- Reduce impact of reuse or disposal of building

Suggested Strategies

- Reuse existing structures
- Specify materials free from ozone depleting substances and/or equipment using CFCs, HCFCs, and halons, balancing ozone depletion potential (ODP) with global warming potential (GWP)
- Specify materials free from toxic chemicals and that do not release toxic byproducts throughout their life cycle, particularly those toxins that are carcinogenic, persistent or bioaccumulative. Key materials to avoid include mercury (switching equipment), arsenic (pressure treated wood), urea formaldehyde (engineered wood), and asbestos
- Specify materials and products that are:
  - Recycled (preferably with high post consumer content), reused/salvaged, remanufactured or from rapidly renewing sustainable sources
  - Sustainably harvested (e.g., specify FSC certified wood products)
  - Obtained from local sources
  - Low in embodied energy
  - Durable
  - Low in VOC and/or other chemical emissions in use (see IEQ section)
  - Low maintenance and not requiring toxic materials to maintain and/or operate
  - Easily reusable, recyclable, compostable, or otherwise biodegradable on disposal
- Design for efficient material use i.e., less material use and standard sizes to reduce waste
- Design for adaptability of building design as user needs change (e.g., reusable movable office divider walls and raised floor systems to enhance future flexibility)
- Design for disassembly and recycle or reuse at end of building life
- Prioritize sensitive areas (e.g., neonatal intensive care units, pediatrics, and maternity departments)
- Specify a careful product substitution review procedure to insure that environmental health performance is not degraded by contractor substitutions

7) Construction Practices

Vision Statement
The construction process affects every facet of design, from site, to materials, to mechanical systems, to indoor environmental quality, and to waste generation. Construction practices will have a significant direct impact on the health of the local environment during construction and will determine if the building achieves its long term health and sustainability goals. The construction team, including construction management, general contractor, and subcontractors are all integral to achieving these goals. The team in place during Construction Administration needs to be fully informed of and, preferably, have a role in developing, the project's sustainable design vision and goals.

Goals
- Establish a partnering relationship between all parties; engage subs and crews
- Maximize reduction, reuse or recycling of construction, demolition and land clearing debris
- Establish appropriate protocols for safe, appropriate management of toxins associated with renovation and demolition.
- Eliminate use of toxic substances, particularly those that are persistent and bioaccumulative
- Protect materials from contamination
- Ensure good indoor air quality
- Control erosion to reduce negative impacts on water and air quality

Suggested Strategies
- Implement a waste management plan for separation and recycling or reuse (including composting, chipping, mulching) of construction, demolition and land clearing debris (CD&L) and proper disposal of residual materials. Crush and reuse demolished concrete, asphalt and masonry for beneficial on-site or off-site use
- Survey for hazardous materials in demolition or renovations (mercury, asbestos and lead) and plan for safe remediation or removal and disposal
- Minimize packaging waste and reuse or return packaging waste to suppliers or manufacturers for reuse/recycling; recycle all packaging that cannot be reused or returned.
- Sequence work phases to minimize negative impacts on habitat and on ambient and indoor air quality
- Implement a site sedimentation and erosion control plan
- Follow the SMACNA (Sheet Metal & Air Conditioning Contractors National Association) IAQ Guidelines for Occupied Buildings Under Construction (e.g., dust control measures, protection of absorptive materials from moisture damage, sequencing installation of interior materials to avoid absorption of volatile organic compounds)
- Allocate time, prior to occupancy, for building flush-out appropriate to climate using new filtration media to assure removal of initial outgassing emissions
- Engage crews, including subcontractor crews, in education sessions to familiarize them with the reasons for and importance of green design and construction practices and to solicit their feedback

8) Commissioning

Vision
The commissioning process ensures the building owner and occupants that all mechanical, electrical and plumbing equipment are operating consistent with the Design Intent Document, and exceeds conventional testing and balancing procedures. An independent third-party commissioning agent offers an objective review and should be part of the design team from the earliest stages.

Goals

- Assure that building elements are installed and calibrated properly to meet the project's environmental health goals in addition to mechanical, electrical and plumbing system performance parameters
- Assure that building occupants are appropriately trained and that thorough and explicit written materials are in easily identifiable and accessible places to ensure proper operating and maintaining of building systems to meet goals

Suggested Strategies

- Contract an independent commissioning agent
- Clearly document design intent
- Specify commissioning requirements, including a commissioning plan
- Review carefully at construction documents and occupancy phases
- Develop an O&M manual for systems operations and ongoing monitoring and calibration
- Verify installation, operation to specifications, training, documentation and access to documentation
- Evaluate post-occupancy commissioning at 6 month or 1 year intervals to ensure continued system effectiveness

9) Operations & Maintenance

Vision Statement

The planning and implementation of a building's operations and maintenance are essential to benefit from the building's healthy green design features. Buildings are designed to last many decades. Practices employed during the life of the building should reflect a commitment to the hallmarks of sustainable building: high performing mechanical systems, healthy indoor air quality, continual recognition of life cycle impacts of materials and methods employed.

Goals

- Reduce the "ecological footprint" associated with materials and methods used during a building's occupancy phase
- Commit to a process of continuous improvement to enhance the building's environmental health performance
- Educate the community

Suggested Strategies

- Program and design adequate dedicated storage and flow space to facilitate recycling and composting of waste.
- Program and design adequate dedicated storage and flow space and cleaning/sanitation facilities to facilitate reuse of items such as medical products, linens, and food service items to replace disposables and reduce waste.
- Program and design adequate dedicated storage and flow space for separation and management of hazardous wastes
- Provide educational opportunities (meetings, newsletters) for all building staff on the building's green design features – the direct and indirect benefits of green design and their role to optimize its performance
- Prepare building operating manuals, to include:
    - Contacts of all involved in design and construction
    - Design Intent documents and as built construction drawings
    - Manuals for all mechanical and electrical systems including how to maximize their efficient operation and how they interact with other building elements
    - System performance monitoring and inspection schedules and protocols, and other ongoing commissioning requirements
    - Green cleaning and maintenance protocols for mechanical equipment, glazing, finish surfaces, lighting and plumbing fixtures and all other housekeeping responsibilities

  - Manufacturers and service/repair contacts for all components
  - Integrated Pest Management practices
- Provide community education (press releases, newsletters, meetings, tours, interpretive displays) on the building's green features

10) Innovation

Vision
Every building is a unique blend of site, program, people, budget, with a unique set of challenges and opportunities. Innovative, integrative design practices recognize that new solutions emerge from a process that engenders creative problem solving and "thinking out of the box". We encourage you to delve into an exploratory process to discover new benchmarks for 21st century health care facilities.

SOURCES:

Minnesota Sustainable Design Guide, University of Minnesota, http://www.sustainabledesignguide.umn.edu/

Leadership in Energy & Environmental Design (LEED), US Green Building Council www.usgbc.org

NY High Performance Building Guidelines, New York City Department of Design and Construction, http://www.ci.nyc.ny.us/html/ddc/html/highperf.html

BREEAM, ECD Energy and Environment Canada, www.breeamcanada.ca

FOR MORE INFORMATION ON THE SUSTAINABLE DESIGN AWARD PROGRAM:

American Society for Healthcare Engineering
American Hospital Association
One North Franklin, Suite 2800
Chicago, IL 60606
Attn: Ilse Almanaza, Director Professional Development
ashe@aha.org
www.ashe.org

Section 1:
Pollution Prevention Checklists

Biomedical laboratories can potentially generate a variety of byproducts and recoverable materials in their operations. Some common types may include:

- Spent clearants (xylene)
- Waste formaldehyde
- Waste alcohols
- Mercury fixatives
- Cyanide lysing solutions
- Used chromium reagents
- Waste Acids and Bases
- Metal bearing reagents
- Dyes and Stains
- Obsolete/outdated stock

Introduction to Pollution Prevention

Although it has become a catch phrase, pollution prevention is an integral facility process. Many biomedical laboratories have been practicing pollution prevention for years. Good housekeeping and inventory management, production optimization, recycling, recovery and reuse are all methods of pollution prevention. Pollution prevention takes these ideas and places them under a single heading, but this does not diminish the practices already in use by many biomedical processing facilities.

Pollution prevention involves questioning and reviewing every facility process, the chemicals used and the associated procedures. The ultimate questions that should be asked are: ***'Am I doing this process this way simply because I've always done it this way?'*** and; ***'Is there a better, less polluting and potentially less expensive, way of doing this process?'*** The answers will often be yes.

Pollution prevention consists of waste management approaches that reduce the amount of waste materials generated or requiring disposal. Pollution prevention can reduce the amount of hazardous and non-hazardous wastes generated in your business.

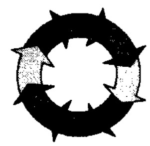
This benefits businesses by minimizing:

- disposal costs
- cost of future liabilities
- transportation costs
- off-site treatment costs
- worker safety costs
- fees and taxes
- insurance costs
- current operating costs (e.g., raw material costs)
- regulatory compliance costs (record keeping, reporting, tracking, lab costs, etc.)

Additionally, pollution prevention can increase business productivity and employee safety, improve environmental protection, and enhance community relations. These benefits may be realized by a business by implementing the following pollution prevention methods:

Source Reduction: is an activity that prevents or reduces the generation of waste materials that may otherwise be released to air, land or water. Examples include: substituting input material or changing production processes to reduce the amount of waste generated. A good example is using mercury free lab chemicals. This eliminates a highly toxic chemical in the facility, reduces environmental liability of disposal, and may reduce waste disposal costs.

Recycling: is the use, reuse, or reclamation of materials. Examples include: employing on-site or off-site techniques to remove contaminants from a waste stream so that the regenerated material can be reused. A good example is distillation of clearants and reuse of the clearant.



To be successful, a pollution prevention program must be organized. It is not hard to organize a pollution prevention program (see Figure 1), but you will need to spend some time to get started. While conducting your self-assessment keep in mind the following principles:

◆ Principles of Pollution Prevention

1. Facility owners/managers must be committed to pollution prevention for it to work.
2. A pollution prevention program should include <u>specific</u> written goals and objectives.
3. Identify your wastes. Are they hazardous or non-hazardous?
4. You should know how your materials and wastes are managed and the associated costs.
5. Train all employees in waste handling and pollution prevention methods.
6. Be aware and follow all waste regulations that apply to your business.
7. Make pollution prevention an integral part of all facility processes, not just a folder on your desk.
8. Identify all the agencies you are working with. Work in cooperation with regulatory agencies. See the regulatory agency as a help and not as a problem.
9. Be prepared to fund pollution prevention programs. You may or may not recoup all costs. Pollution prevention sometimes pays back in non-tangible ways such as improved employee morale.

The following chart shows the basic steps you can use in implementing a pollution prevention program in your business.

STEPS

Initiate a Program
- Ensure both management and employee committment
- Designate Pollution Prevention personnel
- **Set Goals**

Organize Your Business with Pollution Prevention in Mind
- Strategies to reduce waste before it enters the business

Conduct a Waste Reduction Assessment
1. Preliminary Review
2. Facility Walkthrough
3. Identification of Waste Reduction Alternatives

4. Evaluate and Prioritize Alternatives:
   a. Initial Screening
   b. Evaluate Remaining Alternatives
      - Wastestream Priority
      - General Potential for Waste Reduction
      - Technical and Economic Feasibility

   c. Final Selection and Prioritization

Adapt Your Program to Changing Needs
- Periodic Review of Processes and Waste Reduction
- Ongoing Committment

REEVALUATION

Figure 1. Pollution Prevention Program Steps

Liability

Pollution prevention can be conducted in several areas of a business. These areas pose differing levels of liability. It can be said that the more a business does to reduce the amount of wastes generated the less liability for the business. The more wastes a business sends to disposal the greater the business liability (see Figure 2). The different areas are:

1. **Inventory Management** - buy only what you need to reduce out dated stock chemicals. Rotate stock to use chemicals in date sequence. Check delivered stock for damage to reduce spills and to return damaged stock.

2. **Process Modification** - Modify laboratory processes to reduce waste. Simple changes can significantly reduce the amount of wastes generated.

3. **In-Process Recovery and Reuse** - Increase the amount of materials recovered and reused within the facility process.

4. **On-Site Recovery and Reuse** - Increase the amount of materials recovered and reused within the facility.

5. **Interindustry Exchange** - Unused materials can be exchanged between businesses. One business' unused material may be another's raw material.

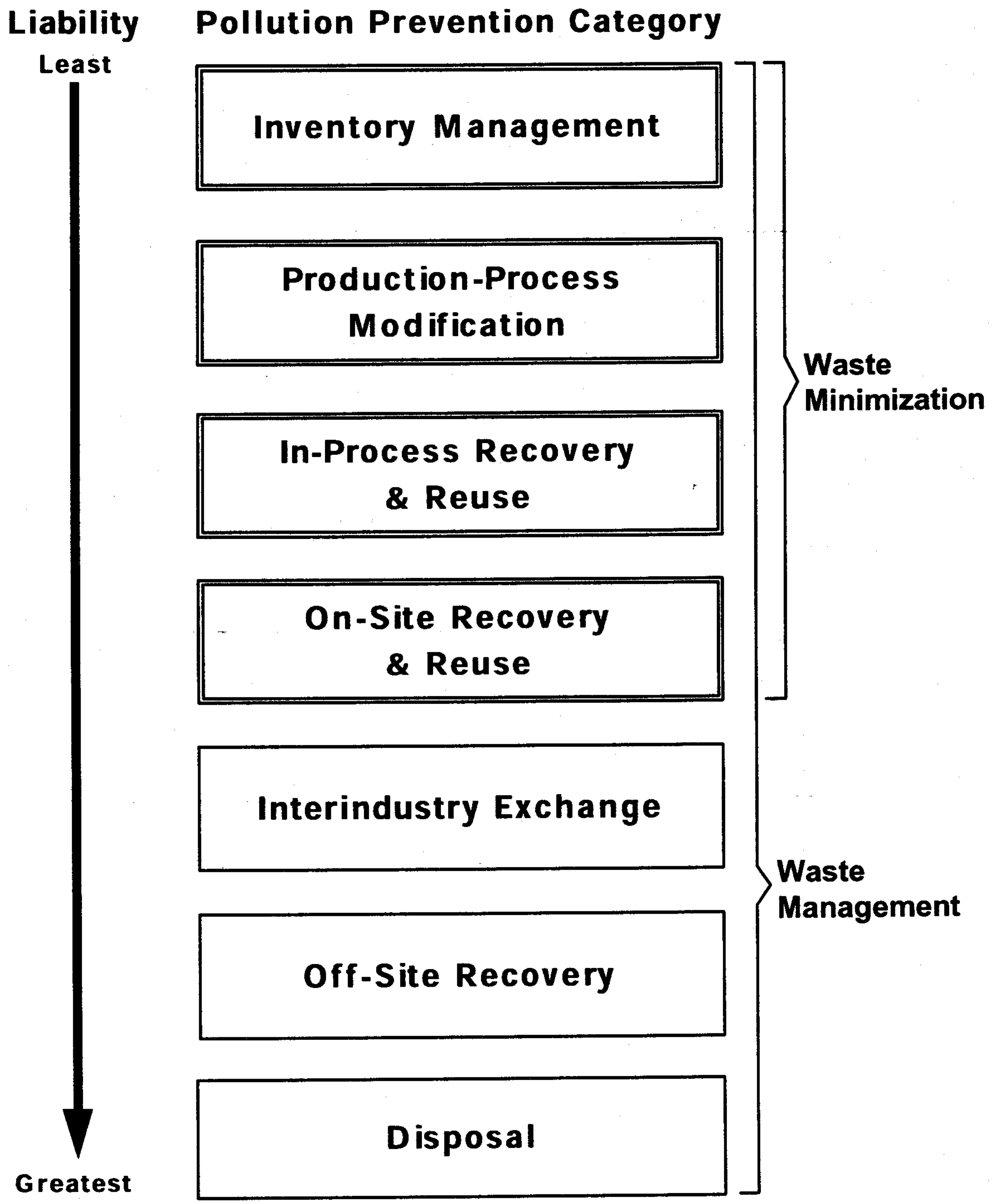
6. **Off-Site Recovery** - Sending materials for off site recycling, reclamation or as a fuel.

7. **Disposal** - Sending materials off-site for disposal as waste. Due to strict regulations hazardous waste disposal carries the greatest level of liability. Disposal is not considered a waste reduction method, but can be an associated process when materials are disposed of properly after waste reduction or recovery techniques have been used.

Note: Treatment is not a method of pollution prevention/waste minimization, but you can treat your hazardous wastes on site if you follow certain regulations. These regulations cover issues of accumulation, storage and labeling requirements, and accident prevention. **See Reference Materials - Managing Hazardous Waste.**

The following chart shows the differing levels of liability by pollution prevention procedure.

Disposal carries the greatest amount of liability.

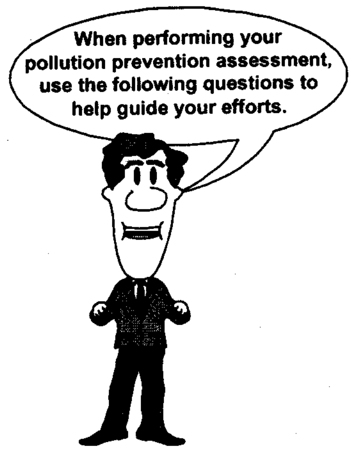


(Adapted from 'Standard Handbook of Hazardous Waste Treatment and Disposal', McGraw Hill, Harry Freeman, Editor in Chief, 1989)

Figure 2. Levels of Liability

Assessing Your Pollution Prevention Opportunities

These checklists will help you perform a pollution prevention assessment. The objective of this assessment is to identify ways to reduce or eliminate waste, or recover materials, through a careful review of your facility operations and waste streams. After selecting a specific area, or areas, to focus on in your pollution prevention efforts, a number of options should be developed and evaluated. Then, evaluate the technical and economic feasibility of the selected options. Select the most promising pollution prevention options for implementation. Finally, review the operation after implementation to modify as needed.



Useful Questions:

1. What are the recoverable materials and/or hazardous and non-hazardous wastes, and from what processes are the materials/wastes, generated? What are the volumes generated?
2. Which wastes are hazardous and which are not? What makes these wastes hazardous?
3. How much of a particular input material is used in the process?
4. What are the raw material process losses?
5. How efficient is the process?
6. Are unnecessary wastes generated by mixing recyclable wastes with other process wastes, especially with hazardous wastes?
7. What housekeeping practices are used to reduce the amount of waste generated?
8. What process controls are used to improve process efficiency?
9. What are the facility's current hazardous and non-hazardous waste disposal costs (including disposal fees, permit fees, raw material purchases, etc.)
10. **Are you mixing hazardous wastes with non-hazardous wastes? This is extremely important. If you mix hazardous wastes with non-hazardous wastes you are increasing the amount of hazardous waste you pay to have disposed. You should be segregating your hazardous and non-hazardous wastes to reduce you disposal costs. This means that you should also be familiar with you wastes and understand what constitutes a hazardous waste.**

See Appendix D - Hazardous Waste Information, for additional Information.

Checklists

Complete the following pollution prevention checklists to see if your business is maximizing pollution prevention techniques.

Management Practices

1. Does your facility have an established pollution prevention program in place? **Yes** **No** **Is a specific person or committee assigned to oversee the success of the program?** **Yes** **No** **Does the program have set pollution prevention goals?** **Yes** **No**	If there is enough staff available, a committee may be more successful than a single person. One person is not always available when necessary, could leave the company or otherwise be absent, and may not have the expertise in all necessary areas (See Figure 1). Pollution prevention programs are more successful if they contain written pollution prevention elements, especially when setting goals.
2. Have you characterized your wastes and formalized a strict waste type definition for your facility wastes? **Yes** **No** **Have you implemented a Source Separation Program?** **Yes** **No** **Have you reviewed your product substitution opportunities?** **Yes** **No**	Biomedical laboratories generate a variety of wastes from hazardous, infectious, radioactive to any combination of these. The six main types of wastestreams are: infectious, chemical, radioactive, multihazardous, wastewater, and recyclable wastes. Each waste is categorized at the time of discard into one of your wastestream categories. The waste is placed in the appropriate container for the type of waste it is at the time of discard. This will achieve source separation. This Code of Practice contains information about substituting less hazardous products in laboratory processes. The best place to start is with those processes that generate the most toxic and hazardous wastes.

3. Are there employee education programs on how to avoid excessive waste generation? **Yes** **No** **How often are the training programs offered?**	You can reduce the amount of waste generated by spills if you train employees to properly handle and store hazardous and other wastes. Some trade associations and local environmental health agencies sponsor employee training seminars and some consulting firms offer employee training as part of their package of services. 
4. Are you fully aware of the current local, state, and federal regulations related to hazardous material storage, treatment, disposal, and recycling? **Yes** **No**	Compliance with existing laws and regulations is helpful to a good pollution prevention program. See Reference Manual, Appendix D - Hazardous Waste Information Manual when reviewing waste generation.
5. Has your facility conducted an environmental assessment to determine regulatory compliance? **Yes** **No**	Assistance is available for any concern. See City and State references in Appendix B, or call the City of Albuquerque's Pollution Prevention Program at 873-7004.

Process Management

Production management involves optimizing processes and scheduling to reduce waste generation and dealing with management practices, such as employer/employee relationships, that may have an influence on the amount of waste generated.

1. Are sequential operations adjacent to each other? **Yes** **No**	Sequential operations should be adjacent to avoid excess material handling. This reduces the potential for material and precious metal losses and reduces accidental spills.
2. Are process solutions prepared by trained personnel? **Yes** **No** **Is there a process in place to ensure the minimum volumes of chemicals are used in all processes?** **Yes** **No**	You can often minimize waste and improve the consistency of process solutions by assigning a limited number of properly trained personnel to mix chemicals.
3. Does your facility maintain fume hoods, collectors and fans in proper working condition? **Yes** **No**	Fume collectors and ventilation fans should be maintained in top working condition. Good maintenance practices will reduce health risks and allow better collection of airborne vapors and particulate.
4. Does your facility have a formal facility inspection plan? **Yes** **No**	Regular inspections of your facility's storage, waste treatment, and production areas will help maintain optimal production and identify equipment and process malfunctions early. This will help you identify equipment and process problems early and provide time to correct problems before a small problem becomes a major issue.

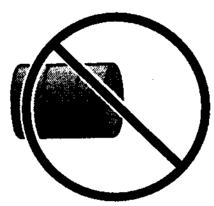
Spill Control

Spill control is especially important for biomedical laboratories because of the toxicity of some of the chemicals used in their process solutions.

1. Does your facility conduct equipment inspections on a routine basis to identify leaks or equipment malfunctions? **Yes** **No**	Routine inspections of your lab's process, storage, and waste treatment areas should be conducted on a regular basis to identify leaks and malfunctioning equipment. Identifying problems at an early stage helps reduce spills and other uncontrolled releases.
2. Do you have procedures in place to handle leaks or spills? **Yes** **No**	Fire departments require spill containment, and material segregation of reactive materials, around storage areas to minimize the spread of any spilled material. Ensuring a quick and proper response to leaks and spills can help you reduce waste generated by the cleanup of spills. Keep an emergency spill plan available and educate employees in its use. Training your employees also satisfies legal requirements. See Reference Manual, Appendix E - Hazardous Materials Emergency Response Plan.

◆ Guidelines for a Hazardous Materials Emergency Response Plan

It is required for any business handling materials which are or may be considered hazardous to have a Hazardous Materials Emergency Response Plan (HMERP) in case of spills. If a business is unable to contain a spill and it is discharged into the sanitary sewer or storm drain, released into the air, or spilled on the ground it is very important to notify the proper authorities. By preparing and filing your Hazardous Materials Emergency Response Plan (with the Fire Department, see Appendix E) you will be fulfilling part of the requirements under RCRA (Resource Conservation and Recovery Act - see Appendix D) Hazardous Waste Reporting and under the Superfund Amendments and Reauthorization Act (SARA) community right to know. Following are some general spill control procedures:



1. **Isolate the spill area and limit entry, evacuate area if necessary**
2. **Tend to any injured or contaminated personnel, seek help as necessary**
3. **Notify the proper authorities if needed:**
   During the work week (Mon-Fri, 8AM to 5PM) call the Industrial Waste Engineer at 873-7004. On weekends, holidays, and after hours telephone notification can be made at 873-6217.

3. **Equip trained personnel with PROPER personal protective equipment**
4. **Identify the material and quantity spilled and select an appropriate approach (see MSDS or 1994 Emergency Response Guidebook for guidance).**
5. **If the spill is treated on site, dispose of the spill in accordance with federal, state, and local regulations.**

Accidental spills happen fast and without warning so it is also important to have spill control equipment available. Businesses have to determine what spill control method is best for them. Following are some methods/treatments a business can use for spill control including sorbents, treatment agents, or hazardous material vacuums for spills.

Sorbents. Are materials that soak up liquids through absorption or adsorption. Sorbents come in particulate, sock, or pillow form. Depending on the spilled material the sorbents may be considered hazardous after the spill has been cleaned up. Paper is combustible and shouldn't be used on oxidizing agents such as nitric acid.

Treatment Agents. Are usually available for acid, caustic, or solvent spills. They come in dry powder form and are shaken, poured, or sprayed onto a spill. When used properly these agents will neutralize and solidify spills.

Hazardous Material Vacuums. Vacuums can be used to clean up dry chemical spills or to collect and contain virtually any dry pollutants.

Other Equipment. Plastic scoops, brooms, pails, bags, dust pans.

Protective Equipment. Personal protective equipment, warning signs, barricade tape.

General Guidelines for Some Common Spills

All Health and Safety measures should be followed in cleanups using the level of equipment appropriate to the chemical spill. (Excerpt from Prudent Practices in the Laboratory, 1995):

- **Materials of low flammability that are not volatile or that have low toxicity.** This category of hazardous substances includes inorganic acids (e.g., sulfuric and nitric acid) and caustic bases (e.g., sodium and potassium hydroxide). For cleanup, appropriate protective apparel, including gloves, goggles, and (if necessary) shoe coverings should be worn. Absorption of the spilled material with an inert absorbent and appropriate disposal are recommended. The spilled chemicals can be neutralized with materials such as sodium bisulfate (for alkalis) and sodium carbonate or bicarbonate (for acids), absorbed on Floor-Dri® , or vermiculite, scooped up, and disposed of according to the procedures detailed in Chapter 7, section 7.B.8. (*Refers to the book Prudent Practices in the Laboratory, 1995*).
- **Flammable Solvents.** Fast action is crucial when a flammable solvent of relatively low toxicity is spilled. This category includes petroleum ether, pentane, diethyl ether, dimethoxyethane, and tetrahydrofuran. Other workers in the laboratory should be alerted, all flames extinguished, and

any spark-producing equipment turned off. In some cases the power to the laboratory should be shut off with the circuit breaker, but the ventilation system should be kept running. The spilled solvent should be soaked up with spill absorbent or spill pillows as quickly as possible. These should be sealed in containers and disposed of properly. Nonsparking tools should be used in cleanup.

- **Highly Toxic Substances.** The cleanup of highly toxic substances should not be attempted alone. Other personnel should be notified of the spill, and the appropriate safety or industrial hygiene office should be contacted to obtain assistance in evaluating the hazards involved. These professionals will know how to clean up the material and may perform the operation.

- **Dyes.** Please refer to the section in the Reference Manual on Dyes, Stains and Chromogens

Emergency & Notification Phone Numbers

- 911 - Albuquerque Fire Department (Hazmat Emergency Response). Describe spill and material to dispatcher.

- 888-8124 Fire Marshalls Office (Hazmat information)

- 843-2551 Poison Control

See Appendix B for a complete listing of phone numbers.

❐ Disposal

1. Do you keep track of all the materials you send to disposal? **Yes** **No**	You should maintain and keep on file all manifests, receipts and tracking materials for wastes you have disposed. To reduce the amount of paperwork and business liability you should review your processes and material use to reduce the amount and number of wastes you currently generate. By not generating the waste you will not have to have it disposed.
2. Do you commingle like wastes prior to disposal? **Yes** **No**	Commingling is the process of combining similar wastes into a larger container. For commingling, wastes should not be reactive and should be of the same hazard classification. Compared to lab packs, commingling can be much cheaper (up to 1/4 the cost) than using lab packs. Due to absorbent materials and waste container space Lab packs typically can only accommodate 14 gallons of wastes in a 55 gallon lab pack. Commingling can accommodate the full 55 gallon drum space. (from: "Laboratory Waste Management: A Guidebook," ACS Taskforce on Laboratory Waste Management, ACS, Washington, D.C., 1994) Commingling should be done carefully and employees should be trained in the procedures. Simple errors such as combining incompatible wastes can endanger your business and/or generate a mixed hazardous waste. This can make your wastes difficult to handle and expensive to have disposed. One example is the segregation of non-chlorinated solvents from chlorinated solvents. Mixing a small amount of chlorinated solvent in with the nonchlorinated solvents will cause the entire container to become a hazardous waste and will be expensive to have handled and disposed.
3. Do you segregate wastes prior to disposal? **Yes** **No**	Segregating wastes can greatly reduce the amount of hazardous wastes you generate, thus reducing your disposal costs. If you mix 1 pound of hazardous waste with 9 pounds of nonhazardous waste you will have 10 pounds of a hazardous waste. Your best option is to make sure that the 1 pound of hazardous waste does not get mixed with the nonhazardous wastes.

For more information concerning Hazardous Waste Regulations see Appendix D - Hazardous Waste Information

❒ Purchasing & Inventory Management

1. Do you purchase chemicals in large volumes? **Yes** **No**	When a large container is purchased, often a small quantity is used and the excess is stored. Large volumes increase the possibility of having excess chemicals in the lab that are past their expiration dates. This results in large amounts of potentially hazardous waste. To avoid costly surplus, purchase chemicals in small prepackaged containers. Purchases should be done to fulfill immediate lab needs; this reduces the possibility of excess chemicals and containers.
2. Do you use all the material in a container? **Yes** **No**	Do not begin new procedures with new chemicals, bypassing previously opened containers. Partially filled containers begin to collect around the lab. Unused chemicals can greatly increase the amount of hazardous wastes a lab generates. Locking chemical storage areas and limiting access may help your business reduce chemical use.
3. Do you properly label chemical containers? **Yes** **No**	The cost of having even a small quantity of unknown chemical analyzed prior to disposal can exceed $1,000.00. **Proper labeling:** ◆ Should be legible and permanent. ◆ All appropriate hazard warning labels (i.e. flammable, corrosive, etc.) must be on each container. ◆ The name on the bottle should correspond with the name on the Material Safety Data Sheet. ◆ Decreases the risk of accidents and injuries resulting from improper use or storage. ◆ Allows surplus chemicals to be reused rather than having to dispose of them. ◆ Reduces analysis and associated costs prior to disposal. ◆ Assists in regulatory compliance, such as the hazard communication plan.

4. Do you track your purchases from the time of purchase to final use or disposal? **Yes** **No**	Tracking what the material was used for and how it was disposed of can lead to significant advances in your business' pollution prevention efforts. Tracking a chemical from purchase to disposal can reduce duplicate purchases. Allowing for redistribution of surplus materials can reduce waste generated from partially filled containers or out-of-date stock. Whatever method you use to track purchases (i.e., computer program, ledger books, note cards, etc.) accuracy relies on the cooperation of all lab employees and should be incorporated in your employee training.

Common chemical tracking systems include:

- Bar coding, such as the system approved by the Health Industry Bar Code Council
- System 39 as used by the U.S. Department of Defense
- Chemical Abstract Service (CAS) registry numbers which are universally accepted for identifying specific chemicals and can be used in a chemical tracking system.

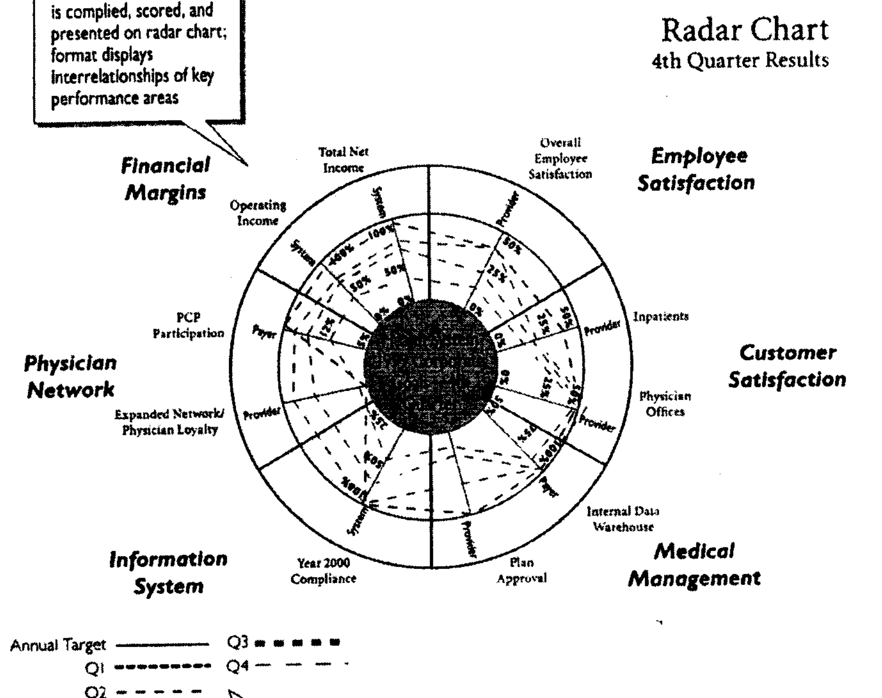
An approach to Organizational Readiness

Ensuring success in large I.T. Implementation Projects.

Frank Smith
Trinity Health International

Dashboard Presentation

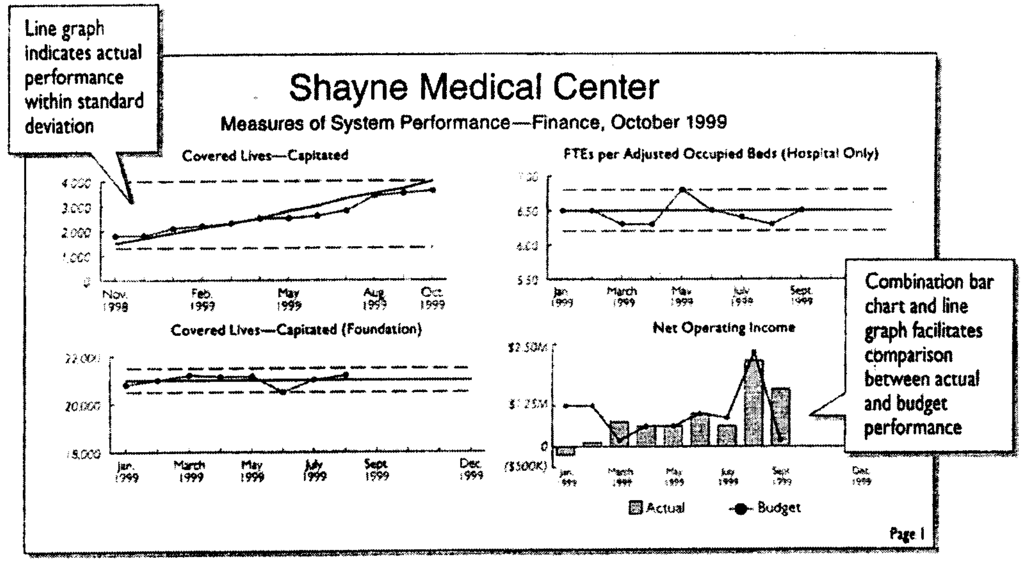
Data for each indicator is complied, scored, and presented on radar chart; format displays interrelationships of key performance areas

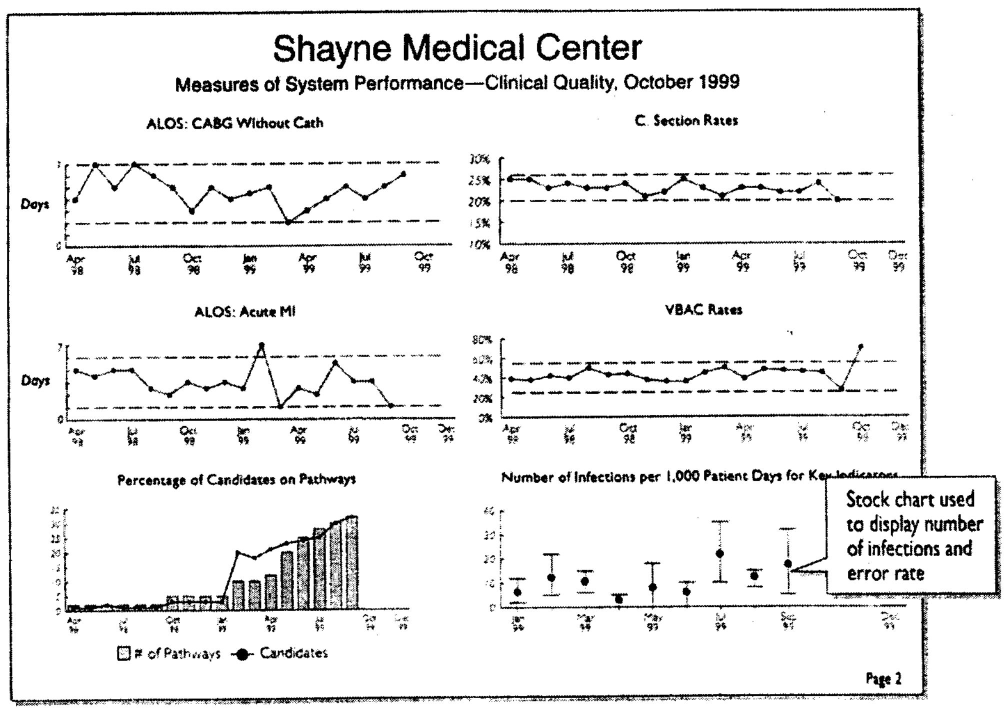


Information on previous quarters' performance is included to trend progression (or regression) toward target

Note: Quarterly data are color-coded in the actual dashboard, making visual recognition of trends and patterns much easier than in this black and white copy. Also, the data contained in these dashboards are for demonstration purposes only and do not reflect actual performance—the Advisory Board has modified all data on the dashboards presented to protect the competitive position of the institutions profiled.

DASHBOARD PRESENTATION





Why Projects Fail

- Ineffective Sponsorship
- Immature Technology
- Inadequate Funding
- Lack of User Engagement

Building Blocks of Successful Projects

- Product
  - Hardware
  - Infrastructure
  - Software (Application, Conversion, Interfaces)
  - Content (Tables, Files, Parameters)
- Transition
  - Policies, Procedures, Processes
  - Education & Training
- Culture
  - Change Management
  - Communications

Transition and Culture are more difficult to manage than Product!

The Organizational Readiness Process is designed to:

- Facilitate Communications among sponsors, project team members and the organization
- Integrate the activities of the sub-teams
- Elevate the visibility of the Transition and Cultural issues.

Components of the Readiness Process

- Executive Sponsor and Sustaining Sponsors
- The Readiness Team
- Readiness Indicators and Metrics
- Readiness Dashboard

Sponsorship

- Executive Sponsor – Person who has "sanctioning authority" over all the people who need to change.
- Sustaining Sponsors – Key Stakeholders responsible for target organizational units.
- Advocates – Persons delegated by sponsors to manage the change processs.
- Targets – Persons who must change for the project to be successful.

Organizational Readiness Team

- Should be chaired by a sustaining sponsor or senior advocate assigned by the Executive Sponsor
- Coordinator – responsible for tracking issues and maintaining the dashboard.
- Periodic reports to the Executive Sponsor and/or Steering Committee
- 12 to 18 members
- Weekly or bi-weekly meetings
- Standing Agenda

Readiness Tools

- Go-Live Check List
- Readiness Indicators & Dashboard
- Issues Log
- Standing Agenda
- Readiness Meeting

Readiness Checklist

- Items that Must be completed prior to go-live
- Examples:
  - Software environment frozen, tested and stable – *Go-live - 2 weeks*
  - All users trained and granted access to the system *Go-live - 1 week*
  - Workstations installed and certified *Go-live -1 week*

Sample Readiness Dashboard

Indicator/Event	Description	Date	Notes	Status
Go-Live Events				
Nursing Documentation - SI	Implementation of Nursing Documentation system for.	31/12/05	Final approval of care plan formats completed on schedule.	
CPOE - SI	Implementation of Physician order entry for Hospital Del Salvador	30/04/06	No agreement yet on Pharmacy rules	
Key Indicators				
Hardware deployed to Nursing Units	Workstations installed at each nursing unit in synch with the training schedule	On-going	ICU completed on schedule. Workstations for Surgery Recovery have arrived.	
Nursing training classes operating at capacity.	Training classes for nurses are 90% full to maintain momentum.	On-going	Latest week 93%	
75% of Medical Staff use the system	System statisticsindicate that 75% of physicians are using the system to retrieve clinical information	31/3/06	For week of 30/11/05, 60% of physicians trained, 54% using	

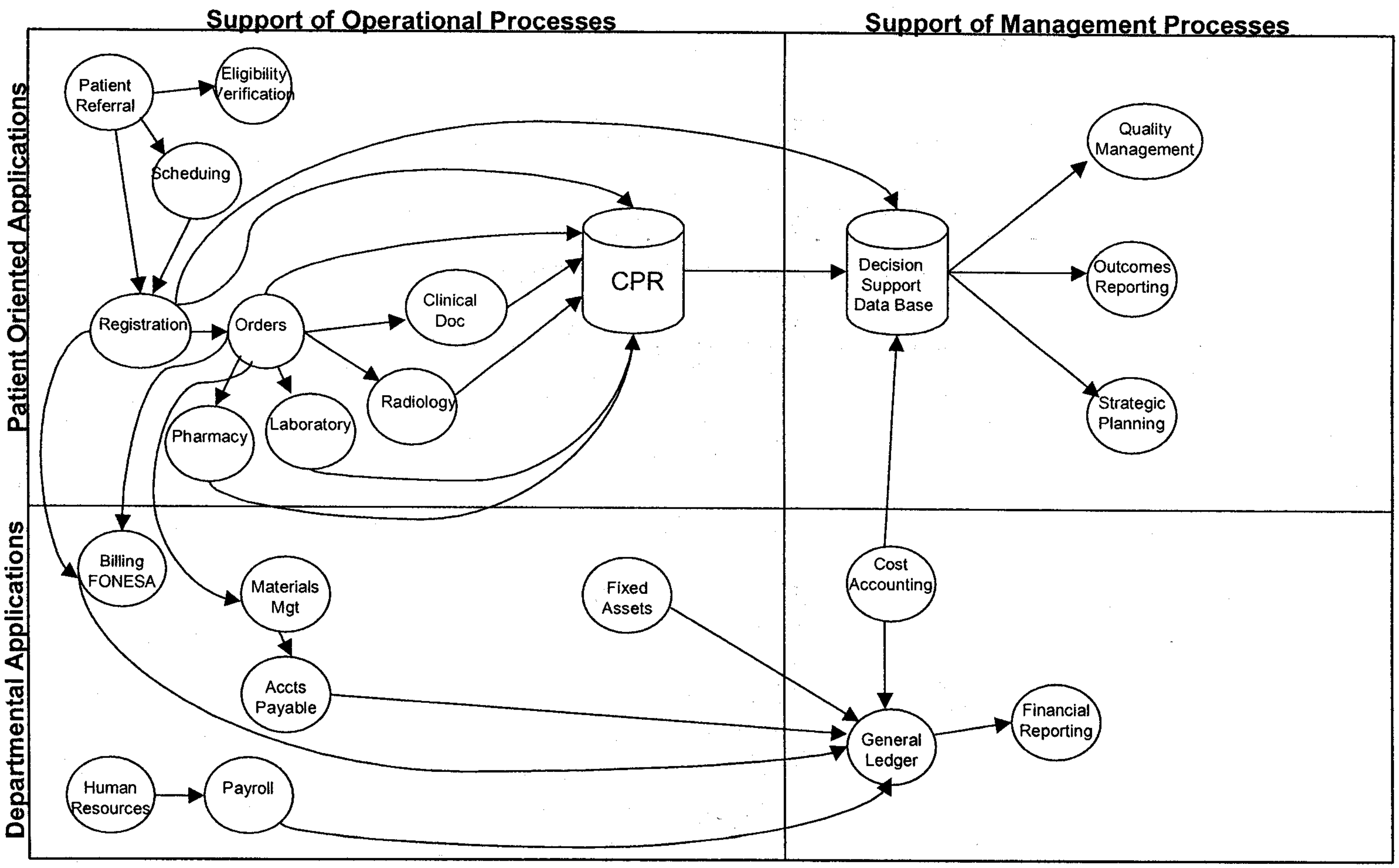
Readiness Meeting Agenda

- Review Summary of previous meeting
- Follow up on open items in the readiness checklist
- Review new items on the checklist
- Discussion, review and approval of new items.
- Key items to communicate to the organization.
- Review updated dashboard.

C. 2

Facility	Patient Management				Clinical Applications											ERP Applications									Reporting Applications			
Department	Enrollment	Patient Scheduling	Referral Management	Registration/Admitting	Order Communications	Pharmacy	Laboratory	Radiology	PACS	Clinical Documentation	Electronic Medical Record	Medical Records	Surgery Management	Physician Practice Management	Departmental Applications	Billing	Accoints Receivable	Materials Management	Accounts Payable	Human Resources	Payroll	Fixed Assets	General Ledger	Financial Reporting	Data Warehouse	Ad Hoc Reporting	Cost Accounting	Clinical Quality Management
National Health Service	■																											
Regional Health Service																												
Salvadore Infante Complex				■	■	■																						
Hospital Del Salvador							■																					
Emergency Department																												
Outpatient Services																												
Surgery																												
ICU																												
Instituto National de Neurocirugia							■																					
etc																												

Sample Application Architecture



MO Readi[illegible]tatus Report
2004

PROJECT GENESIS
Systems for World-Class Patient Care and Safety

C. 4

	Completed - 100% of task finished
	On Track -Progressing as expected
	Not on track - Watch List, MO Executive focused attention required
	Missed Milestone

Site: [redacted]

Date: as of May 31, 2004

PG Milestones	1 Begin Pre-Readiness Meetings	2 Kick-off MO Readiness Process	3 Process Review Meetings & Order Sets Build Sessions	4 CDM Xwalk & Mandatory Build Req Agreed To	5 Cerner Mandatory Build Complete	6 HQ Manadatory Build and MO Process Flow Complete, Cerner Copy for Intg Test Complete	7 Sys & Integ Testing Complete	8 Infrastruct. Fully Deployed & Defined	9 Readiness Action Plan Complete	10 User Acceptance Test Complete	11 CDM Pricing Final	12 Training Start	13 Support Processes Finalized, Build Complete	14 Current Projected Go-Live	15 Post Live Support	16 Wrap-up
% Complete	100%	100%	100%	55%					9%							
Previous month	100%	100%	100%	54%												
Due Date	10/3/2002	12/2/2002	2/28/2003	8/13/2004	12/3/2004	12/24/2004	2/18/2005	3/4/2005	3/18/2005	4/1/2005	4/1/2005	4/1/2005	4/29/2005	5/27/2005	6/24/2005	8/19/2005

Mandatory Build Requirements - Milestone 4 Progress (332 Total Tasks)

Due Date mm-dd-yy	Nursing	Pharmacy	Lab	Radiology	ED/ Urgent Care	Surgical Services	Other Ancillary	Physician	Behavioral Medicine	HIM	Patient Management	Patient Accounts	Hospital Wide	TIS
% Complete	37%	40%	17%	25%	33%	14%	21%	100%	17%	96%	69%	67%	43%	
Previous month	37%	40%	17%	25%	33%	14%	23%	100%	17%	96%	67%	67%	39%	

Action Plan - Milestone 9 Progress (101 Total Tasks)

Action Plan Due Date mm-dd-yy	Nursing	Pharmacy	Lab	Radiology	ED/ Urgent Care	Surgical Services	Other Ancillary	Physician	Behavioral Medicine	HIM	Patient MAnagement	Patient Accounts	Hospital Wide	Revenue Team (Charge Capture)	Training	Communications
% Complete	13%	0%	0%	17%	0%	0%	0%	0%	55%	0%	6%		0%			
Previous month																

Comments:
Milestone 4 tasks are at 55 % completion. 151 open tasks: 47 are "Not Started" and 104 are either "Started" or at least "50% Complete".
Hospital is working with the TIS product teams to revisit and complete build requirements. Hospital iis working on Order Set refinement, further Process Review, and formalizaing the Physician Engagement Plan.

Milestone 9 has 92 tasks open and 40 weeks until the Due date. Hospital must complete a rate of 2 tasks a week to mee the due date. There are currently 0 tasks overdue.

Current Operations

	Financial Stability	Current Month Actual	Current Month Budget	Current Month Variance (%)	Previous Month Actual	Previous Month Budget	Previous Month Variance (%)
Volumes	Discharges				901	852	5.75%
	Surgery						
	ED Visits				1614	1650	-2.18%
Financial	Operating Margin				1.42%	2.86%	-50.35%
	Days Cash on Hand				46.75	50.75	-7.88%
	Days in AR				77.1	58.77	31.26%

Leadership Focus

Competing Priorities ☑ New Construction ☐ New Services ☑ Other Major IT Projects ☐ Other

Executive Participation ☐ Leads MO Readiness Team ☑ PGST Presence - on call not able to announce presence

Comments: The ERGO care planning implementation competes for clinical resources with PG. If the ERGO implementation continues to extend its time, there may be difficulties in completing Order Set submission and Process Review tasks.
The contstruction for the new ED continues.

Organizational Focus

Key Vacancies
1.
2.
3.

Comments:

The Watch List

Risk Items	Action Plan	Responsible Party	Target Date For Resolution
1. Physician Engagement: Drop in Physician Informatics particiaption	Readiness Team to work formulate Physician Engagement Strategy including the definition of both short and long term goals for physician participation.		5/1/2004
2. Cerner/Acuscan two-way interface	Monitor Cerner's progress on development of this interface for external client.		10/1/2004
3. Radiology: No solution has been identified for Film Tracking functionality after go live.	Continue to explore feasibility of RadNet or other solutions.		10/1/2004
4. There are multiple concerns regarding the ability to continue to provide pharmacy services to external hospitals (Galena and Elkater) using PharmNet.	Working with PharmNet team and other TIS resources to identify solutions		10/2/2004
5. The liklihood of not having PowerPlan ordering functionality for Dubuque's go-live in May '05 creates a further challenge in demonstrating the advantages and usabilityof the CPOE system to the physicians.	Readiness Team is discussing options		5/1/2004

	Corporate Office Team Comments	MO Response (Optional)
Communications	Members of the Hospital Project Genesis Readiness Committeee met with members of the marketing department to discuss a series of articles planned for the employee and physician newsletter. The CFO has reported that he plans to do job shadowing with different hospital employees that are key to our revenue cyle.	
HIM	No report.	
Nursing	See Physician section.	
Pharmacy	Interface between Accuscan (Bedside Scanning - POS) with Cerner. TIS position that MO informed Accuscan would not be interfaced with Cerner. Resources (MO & TIS)	
Physician	MO has tool kits to support order set design and clinical rule selection. MO oriented to physician workplan. Currently reviewing previous build requirements that were submitted. Recently educated team on process for using new Zynx care set designing tool and accessing other MO care sets. Adding additional sets at this time. Alerted to clinical rules process which gets underway this summer. Physician Advisory Group is restarting monthly meetings.	
PMO	Readiness and other teams reengaging and preparing for upcoming flight path meeting. Will include high level physician engagement and rev cycle plans. Discussions on earlier key watch list items (web version and accuscan interface availability etc)	
Revenue Cycle	No report.	
TIS	Validating previous build requirements for care sets. Pharmacy build requirements in process. Mandatory build requirements due mid August.	

CERNER® CASESTUDY

New York Methodist
Hospital Quickly Gains Value from IT Solutions

Client: New York Methodist Hospital

Location: Brooklyn, N.Y.

Licensed Beds: 570

Goals: Unified information technology solutions, patient safety

Affiliations/Memberships: Part of the New York-Presbyterian Health System; affiliated with the Weill Medical College of Cornell University.

Cerner solutions: *PowerChart®, CapStone® Enterprise Scheduling Management, PowerOrders®* (CPOE), *PowerChart Office™, RadNet®, SurgiNet®, PharmNet®, CareNet® Nursing Documentation, Remote Hosting Option*

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— Dr. Emil Baccash

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In July 2003, the organization began its journey by going live with Cerner laboratory, radiology, pharmacy, scheduling and electronic medical record (EMR) solutions. Just six months later, in January 2004, the hospital built upon that foundation by implementing the nursing documentation system and CPOE, including a closed-loop medication process.

Less than a year after its CPOE implementation, New York Methodist, located in the Park Slope section of Brooklyn, N.Y., has been able to track, document and verify substantial savings from Cerner solutions across the organization.

From a bottom-line perspective, dollars saved from reduced average lengths of stay, avoidance of adverse drug events, and increased efficiencies in the pharmacy and laboratory totaled $3.8 million in 2004. Nurses at New York Methodist have also benefited in many areas, saving the time formerly taken up with paper and pencil documentation, so that they can spend more time with patients. A specific example includes the elimination of the night medication check that came about with an integrated medication process, which resulted in operational savings of more than $322,000 in 2004.

Providing High-Quality Care

New York Methodist's highest priority is caring for the people who come through its doors. Because of the Cerner CPOE and pharmacy solutions, New York Methodist now has a closed-loop medication process, which greatly reduces the chance for human error in the crucial medication management process.

In the period following the CPOE go-live, New York Methodist recorded an approximate 30 percent drop in the amount of adverse drug events. The *Journal of the American Medical Association* estimates that each ADE costs a healthcare organization an average of $4,685. By reducing the occurrence of ADEs, New York Methodist avoided more than $887,000 in associated costs in 2004.

"I have reviewed our medication error variance and trends prior to implementation and to date," said Eric Balmir, pharmacy director. "Omission errors have dropped more than 50 percent and transcription and legibility errors have been eliminated completely. We are looking at an overall drop of 22 percent in med errors."

Access to information is essential in high-stress areas such as critical care.

"As the manager in critical care, I find it easier to review charts," said Mary Magee, R.N. "We can take a mobile computer with us on interdisciplinary rounds with the intensivists so we have the most up-to-date information. We can view the patient data online while we are physically looking at the patient. We can order medications and laboratory tests right then and there."

Decreasing Costs

The most significant area of bottom-line cost savings for New York Methodist is the reduction in average length of stay (LOS). CPOE was fully implemented by July of 2004. The remaining 6 months of the year witnessed a 0.251 decrease in days per case. This reduction of 6.02 hours per patient stay translated into 99,252 fewer patient hours and cost savings of $2.6 million in 2004.

The drop in average LOS can be attributed to the decrease in the amount of time clinicians spend completing tasks and from improved communication among care team members.

"We certainly have access to more information," said Kathleen Mazza, R.N., assistant vice president of nursing. "We can improve the communication between the physician and nurses."

Labor and Pharmacy Cost Savings

In addition to reduction in LOS and adverse drug events, New York Methodist has realized substantial cost savings in the laboratory, and pharmacy supplies, labor and drugs.

In the laboratory, CPOE has cut the time needed to post samples to the medical record by 78 percent. In the receiving area of the lab, New York Methodist has been able to reduce one FTE due to the removal of paper from the process. Repeated tests have also been decreased.

More Time Devoted to Care, Less on Paperwork

This access to information translates into more time for clinicians to provide care. Individual tasks, such as assessments, admissions, discharges, medication checks and shift reports now are completed much more rapidly, or in some cases, entirely eliminated. The ability for nurses to complete their documentation online provides them more time to do other tasks, such as engaging in patient education.

"We are at 96 percent compliance with smoking cessation education for congestive heart failure patients," said Mazza. "And the remaining four percent is due to patients coming from an area that was still charting on paper. Now that all of our units are computerized, we should be near 100 percent.

"With CPOE, the nightly medication check is no longer necessary," said Janice Wise, R.N., nurse manager. "CPOE requires a correct order from the physician before proceeding. The med check used to take one hour. Now the process has disappeared due to the automated verification process."

In the time-sensitive critical care area, the nursing time saved is crucial. Eliminating redundant tasks can literally be a matter of life and death for critical care patients.

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Successful Implementation Leads to Benefits

New York Methodist was able to move very quickly from planning to implementation to obtaining real results from its IT investment. The organization began implementing the building blocks of the EMR, scheduling, laboratory, radiology and pharmacy in 2003. Then in 2004 the hospital took the next step of implementing clinical documentation and CPOE in its acute care units and the emergency department.

"We chose Cerner for their strategic vision, financial stability and leadership position in the market," said Lauren Yedvab, senior vice president. "As we continue to work together, we look forward to the continued development of sophisticated solutions that match the complex nature of our organization."

	Realized Benefits in 2004	Realized Benefits Projected For Full Year
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Total Cost Avoidance	$3,513,995	$6,436,509
Decreased Costs		
Reduced Labor Cost		
Nursing Unit Clerk	$20,329	$40,658
Laboratory	$16,250	$32,500
Total Reduced Labor Costs	$36,579	$73,158
Reduced Expenses		
Pharmacy-Supply	$61,904	$82,539
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Total Reduced Expenses	$244,430	$325,906
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Total Benefits	$3,795,004	$6,835,573
Labor Available for Reallocation		
Nursing - Elimination of Night Med Check	$322,885	$645,770
Total Projected Benefit	$4,117,889	$7,481,343

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CERNER
POWERCHART

PowerChart
The Complete Electronic Medical Record

As health systems grow and expand to meet patient needs, paper-based records become scattered across towns and regions. Care teams, then, cannot access the complete, timely information they need to deliver quality care effectively and efficiently. Healthcare organizations' top clinical information technology priorities—including data repositories and outcomes management tools—require information systems that can combine financial, operational and clinical information for comprehensive analysis.

Cerner *PowerChart*® creates an enterprise-wide, multi-facility, longitudinal electronic medical record (EMR). Authorized physicians, nurses, pharmacists, lab technicians and business office personnel can all access one patient record at the same time—an impossible task with a cumbersome paper chart. With a single, integrated EMR, information is available whenever and wherever it's needed. Always up to date, always easy to find and always complete, the applications within *PowerChart* enable a care team to plan, orchestrate and document optimal care.

The Intelligent Way

PowerChart is the only intelligent solution available that is designed to automate and enhance the many phases of the care delivery cycle. It provides the foundation for a multitude of Cerner point-of-care solutions, including home care, physician offices, clinics, emergency care, acute patient care, critical care and long-term and rehabilitation services.

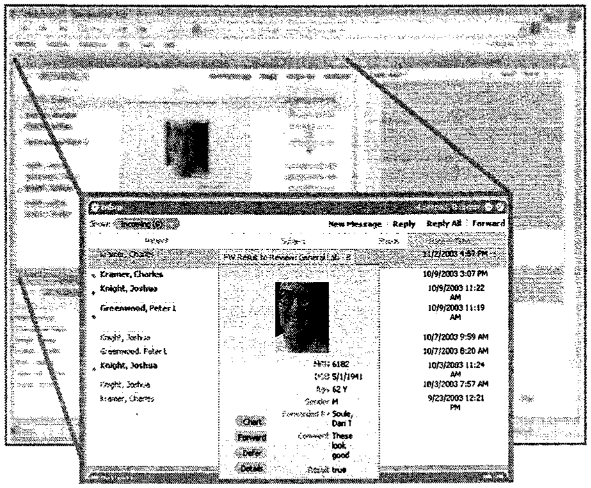
PowerChart is built on scalable, unified, person-centric *Cerner Millennium*® architecture. Using this industry-leading architecture, *PowerChart* delivers the most comprehensive set of capabilities that enable providers to dramatically improve the quality and efficiency of care delivery. Advanced flexibility and functionality provide improvements in workflow and streamline procedures—closing the loop on the medication process.

Enterprise Clinical Data Repository

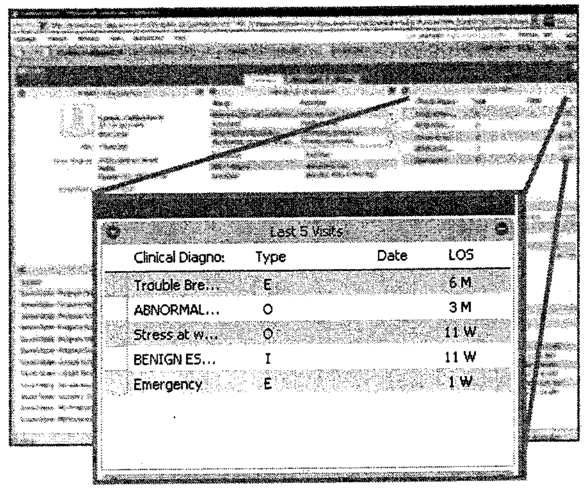
The *PowerChart Enterprise Clinical Data Repository* (CDR) is a longitudinal chart viewing application that provides pervasive access to comprehensive information. Cerner's powerful, intelligent EMR connects facilities hundreds of miles apart in a variety of settings, including acute, sub-acute, ambulatory and rehabilitation environments. To better serve individual preferences, intelligent views can be customized so clinicians can access current and complete patient information in the way that best suits their needs. Organizations can maximize value by adding other patient care solutions to the data repository, including clinical documentation, computerized physician order entry, and protocols and pathways. These capabilities add another element of structure to the clinical processes and help eliminate variance across the continuum of care.

Key Benefits

- Improve coordination and identification of patients at all locations throughout the healthcare enterprise
- Reduce duplicate testing caused when outpatient results are unavailable during inpatient visits
- Positively impact cash flow by using an online electronic signature to reduce the number of incomplete charts
- Speed the bill submission process
- Reduce the risk and costs of waiting hours or days for paper-based results
- Provide access to records from any location, at any time, and by multiple users
- Enhance clinical decision-making with real-time or online access to patient information



Home Page - Integrated, user-friendly Inbox and Schedule views optimize navigation ability



Standard Display - Concise, single view of the patient's complete EMR maximizes efficiency

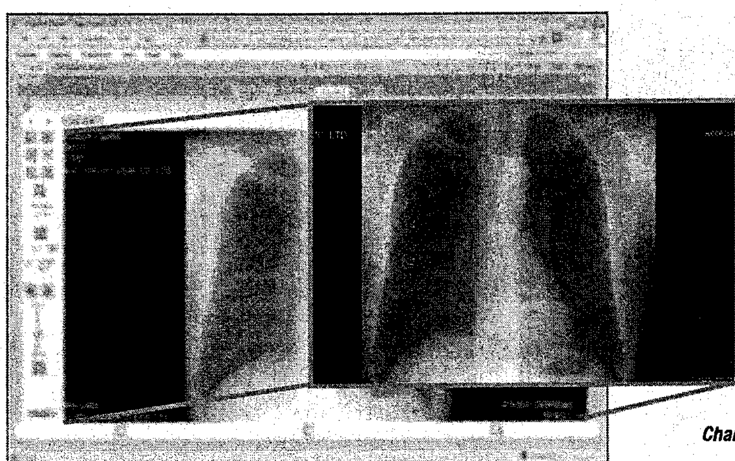


Chart View - Quick, easy access to images streamlines workflow

⊝ The Industry's Best System Security

The unique rule-based security model in *PowerChart* restricts access to information on a "need-to-know" basis, assigning varying security levels to demographic and individual clinical data elements. Your institution has the power to determine the level of confidentiality for each data element, based on the role each caregiver has with the patient. Security measures also enable compliance with HIPAA security and confidentiality regulations.

⊝ Clinical Decision Support

Cerner Millennium, the foundation for *PowerChart*, is designed with built-in expert medical knowledge. *PowerChart* works with Cerner *Discern® Knowledge Systems* to make sure clinicians always have access to the breadth of information they need to make informed decisions. By integrating existing laboratory and pharmacy data into a single enterprise CDR and applying Cerner's proven adverse drug event alerts, caregivers can reduce the risk of medical error and improve overall care quality.

⊝ An End to the Paper Chart

Major healthcare organizations are using *PowerChart* to eliminate the paper chart forever, thus reducing chart pulls, improving the accessibility of records and data, and saving valuable time. The complexity of today's healthcare environment requires an EMR that is functional, flexible and readily available. Whether your organization needs a clinical data repository, a foundation for an electronic medical record, or a complete EMR, *PowerChart* is the intelligent solution.

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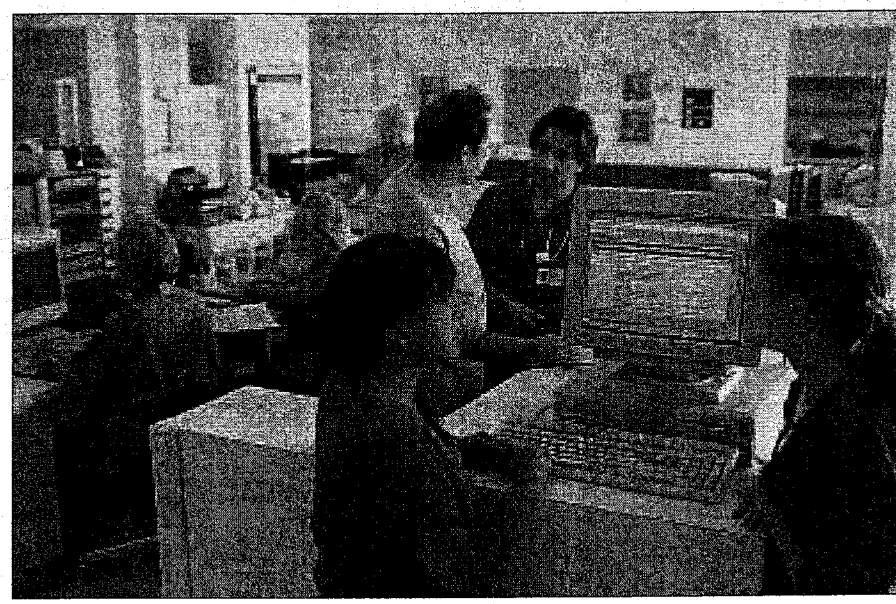
CERNER® MANAGED SERVICES

Cerner's Remote Hosting: The Enabling IT Solution for Healthcare Organizations

Advanced information systems are one of the most important ingredients for transforming healthcare and overcoming the many challenges providers face today. Whether it's improving quality and patient satisfaction, or squeezing additional costs from the system, Cerner has the information to help clients adapt, survive and prosper in today's unforgiving business climate. Traditionally, the most advanced IT systems have often been beyond the reach of many healthcare organizations due to the complexity and cost involved in the management and support of these systems. As developers of healthcare's most advanced information systems, Cerner understands the resource challenges and constraints faced by health services providers. Cerner's Remote Hosting Option (RHO) addresses many of these challenges, providing a solution for healthcare IT that enables any size healthcare organization to benefit from Cerner's industry-leading information management software.



With RHO, Cerner provides secure hosting, hardware, connectivity and IT expertise from our state-of-the-art Technology Center. RHO allows you to use the most sophisticated and powerful IT solutions available today, getting superior performance and increased security, reliability and scalability.

The result: You're able to deploy Cerner administrative, clinical and patient care solutions without the upfront capital and resource investment required to build, maintain and secure an IT infrastructure.

With Cerner's Remote Hosting, you're free to focus on the core business of providing healthcare, with confidence you have a "World Class" HIPAA-enabled and ISO 9001: 2000 certified data center (certified since 2002) infrastructure supporting your Health Information System.

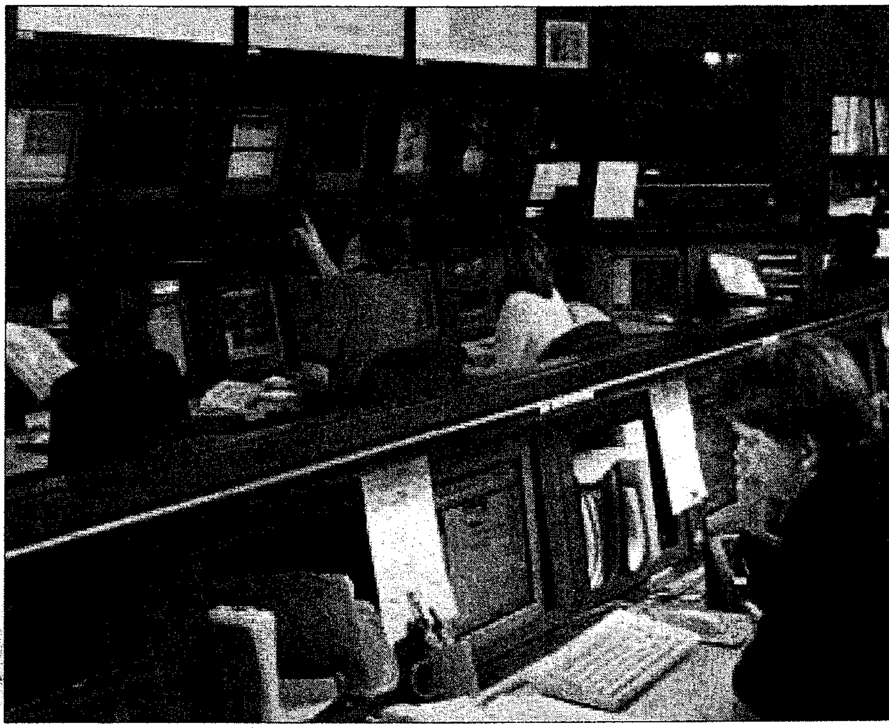
Our RHO service level commitment allows you to concentrate on providing high quality, safe health services — Cerner handles the rest.

The Cerner Technology Center

Healthcare organizations that choose Cerner's RHO for their IT needs can expect uninterrupted connectivity and professional system maintenance and support — thanks to the Cerner Technology Center.

Benefits of RHO:

- Reduce expense: With RHO, affordable monthly pricing and lower upfront costs allow you to better leverage cash and predict costs. RHO also provides built-in protection against platform scalability limits and system obsolescence.
- Reduce time and cost of implementation: By leveraging Cerner's infrastructure and expertise, RHO can reduce the time and cost of system implementation. That means you generate a return on your IT investment more quickly.
- Reduce technical and performance risks: RHO shifts technical responsibility and accountability for both building and managing the technical infrastructure to Cerner. A Service Level Agreement (SLA) with identified metrics ensures optimal system performance is delivered. Cerner becomes the single point of accountability.
- Gradually "scale up" in developing IT infrastructure: Many healthcare organizations are pursuing a gradual, progressive approach to fulfilling their IT goals. Cerner's RHO provides a scalable introduction to Cerner solutions that allows providers to realize the benefits of world class information technologies, while avoiding large initial capital outlays and growing IT resource challenges.



Located in Lee's Summit, Mo., this high-tech ISO 9001: 2000 facility has been certified since 2002. The 21,000+ square-foot center offers superior levels of redundancy and disaster protection to ensure maximum system availability. The Cerner Technology Center provides a level of service and protection that few clients could afford to replicate themselves, including:

- ☐ "Building-within-a-building" construction, complete with raised flooring, secondary roofing and water-detection sensors.
- ☐ The 24x7x365 monitoring of the facility is primarily accomplished through a single-console facility monitoring system located in the command and control room.
- ☐ Forced air and chilled water units on redundant power sources. A dedicated utility substation that exclusively serves the needs of the center, along with primary and backup transformers, and on-site emergency generators.
- ☐ Numerous access control provisions, including camera recording, entry alarm, keycard and biometric systems.
- ☐ Continuous, pro-active monitoring of hardware, software and connectivity to identify and avert problems before service to users is interrupted.
- ☐ Dual carriers, routers, switches and LAN servers to provide primary and backup network resources.

Today's Technology Challenge Solved

Together, Cerner's RHO, *Cerner Classic*™ and *Cerner Millennium*® applications, and the Cerner Technology Center mark a breakthrough in the evolution of healthcare information technologies. Cerner now offers remote hosting solutions for clients operating in both *Cerner Classic* and *Cerner Millennium* environments.

Cerner's industry-leading *Cerner Millennium* health network architecture (the most advanced healthcare information system on the market today) is now available to any healthcare organization. That means improved quality, reduced costs and enhanced productivity. Finally, all health services organizations can take advantage of the wide-ranging benefits that advanced administrative, clinical and patient care systems can provide.

Convinced that IT can help your organization deal with the challenges of today's healthcare environment but are not sure where to begin? Contact Cerner today to find out how Remote Hosting can help your organization make the transition to smarter healthcare.

For more information about the RHO solution for your organization, contact a Cerner Direct Sales Desk associate by telephone at (816) 201-0090 or (888) 421-2048, or by e-mail at CDS@cerner.com.

SIEMENS

SAP

For Immediate Release
April 26, 2005

SAP and Siemens Announce Global Alliance to Drive Greater Efficiency in Healthcare

Joint Offering Will Provide Best-in-Class ERP and Clinical IT Solutions for Healthcare Organizations

COPENHAGEN, Denmark – April 26, 2005 – Two of the world's leading IT providers, SAP AG (NYSE: SAP) and Siemens AG (NYSE: SI) today announced a global strategic alliance to deliver an integrated information technology (IT) offering to the healthcare provider market. With more than 10 years of experience working together in the healthcare industry, SAP and Siemens are expanding their partnership to help drive patient safety, increase efficiency and transparency, promote growth and innovation and reduce total cost of ownership (TCO) for healthcare organizations worldwide. The Siemens Soarian® and SAP Healthcare solution will first be made available in the United States, Germany and Japan using an integration powered by SAP NetWeaver™. The announcement was made at SAPPHIRE® '05, SAP's international customer conference being held in Copenhagen, Denmark, April 26-28.

With the joint solution from Siemens and SAP, healthcare organizations can conduct collaborative business planning, in-depth financial analysis and accounting and human resources tasks. They can also count on having strong patient-management capabilities while significantly reducing paperwork. Diagnostic and therapeutic services can be better coordinated and caseloads and treatment plans can be better managed. Internal and external procurement and logistics, equipment maintenance and other business processes can be better supported.

As a world leader in medical equipment and IT solutions, this relationship leverages Siemens' expertise in enterprise IT systems and advanced medical imaging technologies for the diagnosis, treatment and monitoring of patients. Additionally, customers for the new joint offering will benefit from Siemens' years of experience in clinical workflow improvement and clinical process redesign.

"The joint approach of Siemens and SAP brings powerful workflow management expertise, deep IT domain experience and committed customer service to bear to help healthcare organizations attain productivity improvements as well as a lower total cost of technology ownership," said Prof. Erich R. Reinhardt, president and chief executive officer of Siemens Medical Solutions. "This alliance complements Siemens strategy for transforming healthcare through innovation, benefiting all areas of a healthcare organization along the entire value chain."

SAP will provide best practices gained from experience with more than 1,000 successful implementations for ERP and patient administration systems in public and private healthcare, education and research organizations of all sizes around the world. Additionally, the collaborative nature of SAP® solutions will enable healthcare organizations to manage complex environments by seamlessly integrating a diverse landscape of software systems, including those that manage human capital; financials; quality; environment, health and safety; customer relationships; supply chain and supplier relationships; plant maintenance and facilities.

New Solution to Mend System Integration Pains

The joint solution is designed to improve collaboration between clinical and administrative departments, via a user-friendly portal, to allow for better transparency of systemwide information. This integration will not only help providers better manage these processes, but will also help healthcare organizations comply with numerous regulatory requirements, including the Healthcare Insurance Portability and Accountability Act (HIPAA) in the United States. The solution will equip healthcare organizations with an IT backbone to manage real-time clinical supply chain management processes from point-of-care to back-office.

"The needs of the healthcare world are changing and roles are evolving that requires clinicians, doctors and support staff to use new processes that break down boundaries between systems and departments," said Tom Shirk, president, SAP Global Public Services. "This new solution provides the flexibility to define and adapt these new roles and processes as they evolve, allowing providers to be more efficient while providing better care for patients."

About Siemens Medical Solutions

Siemens Medical Solutions of Siemens AG (NYSE: SI) with headquarters in Malvern, Pennsylvania and Erlangen, Germany, is one of the largest suppliers to the healthcare industry in the world. The company is known for bringing together innovative medical technologies, healthcare information systems, management consulting, and support services, to help customers achieve tangible, sustainable, clinical and financial outcomes. Employing approximately 31,000 people worldwide and operating in more than 120 countries, Siemens Medical Solutions reported sales of 7.07 billion EUR, orders of 8.12 billion EUR and group profit of 1.05 billion EUR for fiscal 2004. More information can be obtained by visiting http://www.usa.siemens.com/medical-pressroom.

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SAP is the world's leading provider of business software solutions*. Today, more than 27,000 customers in over 120 countries run more than 91,500 installations of SAP® software—from distinct solutions addressing the needs of small and midsize businesses to enterprise-scale suite solutions for global organizations. Powered by the SAP NetWeaver™ platform to drive innovation and enable business change, mySAP™ Business Suite solutions are helping enterprises around the world improve customer relationships, enhance partner collaboration and create efficiencies across their supply chains and business operations. SAP industry solutions support the unique business processes of more than 25 industry segments, including high tech, retail, public sector and financial services. With subsidiaries in more than 50 countries, the company is listed on several exchanges, including the Frankfurt stock exchange and NYSE under the symbol "SAP." (Additional information at <http://www.sap.com>)

(*) SAP defines business software solutions as comprising enterprise resource planning and related software solutions such as supply chain management, customer relationship management, product life-cycle management and supplier relationship management.

###

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Jason Loesche, +1 (610) 661-8541, j.loesche@sap.com, EDT
Bonnie Rothenstein, +1 (610) 661-8867, bonnie.rothenstein@sap.com, EDT
SAP Press Office, +1 (610) 661-3200, press@sap.com, EDT
Mirko Lueck, Burson-Marsteller, +49 69 238 09-58, mirko_lueck@de.bm.com, CET
Shoshana Lombardi, Burson-Marsteller, +1 (202) 530-4550, shoshana_lombardi@was.bm.com, EDT

Siemens Medical Solutions, International Public Relations
Axel Wieczorek, +49 9131 84-8335, a.wieczorek@siemens.com

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Unified Person-Centric Architecture Delivers Unrivaled Breadth and Depth

Since 1979, Cerner has designed and developed solutions that ensure health professionals *know now.* Proactively infusing healthcare workflow with timely, relevant information, our solutions strengthen clinical, operational and financial decision-making to optimize outcomes.

Benefiting from a cumulative R&D investment of more than $660 million and an additional planned investment of $1 billion over the next six years, the person-centric *Cerner Millennium*® architecture delivers breadth and depth no competitor can match. Cerner solutions span the care continuum and include:

Direct Care Solutions

PowerChart® Electronic Medical Record System is the enterprise clinician's desktop solution for viewing, ordering, documenting and managing care delivery.

PowerOrders® computerized physician order entry (CPOE) solution enables electronic ordering of tests, medications and other services, incorporating a decision support engine, clinical documentation and an electronic medication administration record.

CareNet® Acute Care Management System automates and streamlines care delivery processes, improving coordination and collaboration across the entire multi-disciplinary acute care team.

FirstNet® Emergency Department Information System provides a comprehensive ED solution, supporting patient tracking, orders, documentation, discharge instructions and prescriptions while achieving regulatory compliance and optimizing reimbursement.

SurgiNet® Perioperative Solutions address the major perioperative service processes, including staff and resource scheduling, materials management, patient tracking and nursing and anesthesia documentation. Comprehensive management reporting supports thorough analysis.

Cerner Critical Care Solutions automate the entire critical care process, supporting complete nursing documentation with automated capture of bedside monitor and device data and streamlining physician workflow with documentation and embedded CPOE.

PowerChart Office® Management System supports the broad range of clinical and business activities of the physician office, clinic or large physician organization. The system links the office with other medical entities and automates care team activities.

PowerPOC™ automates the documentation of medication administration and tasks related to physician and nursing orders at the point of care.

Clinical Center Solutions

PathNet® Laboratory Information System addresses the clinical, financial and managerial needs of a comprehensive laboratory setting with unified solutions for: general laboratory, microbiology, blood bank transfusion, blood bank donor, anatomic pathology, human leukocyte antigen (HLA) genomics/molecular diagnostics and outreach services.

RadNet® Radiology Information System fulfills the requirements of radiology departments and services, enabling them to replace manual, paper-based systems and processes with computer-based alternatives that promote safety and efficiency.

Cerner ProVision™ PACS provides a comprehensive workflow for image storage, viewing, reporting and distribution.

PharmNet® Pharmacy Information System is a complete solution offering clinical decision support, formulary management and operational support, optimizing patient safety and pharmacy resource utilization.

Knowledge-Driven Care Solutions

The ***Discern Expert®*** solution is an event-driven, rules-based decision support application that allows users to define and implement clinical and management rules against event data captured or generated by other applications.

The ***Discern Explorer®*** solution is a decision support application that allows users to execute predetermined or ad-hoc queries and reports regarding process-related data.

Executable Knowledge® solutions help clinicians assess and treat illnesses and improve outcomes based on the most current medical knowledge. Knowledge is embedded via order sets, care plans and alerts.

MediSource™ solutions provide caregivers and consumers with access to drug information from *Cerner Multum®* and the ability to perform drug interaction checking to prevent adverse events.

Cerner APACHE® clinical decision support and outcomes management systems manage the clinical and financial outcomes of high-risk patients in critical and acute care settings.

The Health Facts™ repository is Cerner's comparative data warehouse for benchmarking information and services for subscribers to support improvement processes.

Specialty Care Solutions

Cerner Women's Health Information System automates the care processes in women's centers, ob/gyn offices, labor and delivery units and in newborn care areas. The solution supports the clinical workflow and information needs specific to women's healthcare.

CVNet® Cardiology Information System automates processes within the cardiology department, supporting scheduling, ordering, documentation and data capture.

PowerChart Oncology Information System automates the clinical decision-making and complex communication needs of the medical oncology care team. It provides the ability to share information across venues for complex, multi-encounter chemotherapy protocol management.

Consumer and Community Solutions

IQHealth® extends person and provider relationships beyond the walls of the traditional healthcare setting, establishing organizations as trusted resources for healthcare information and services. Individuals can record, track and securely exchange personal health information with providers.

The HealthSentry™ bio-surveillance network collects critical biological information about potential disease outbreaks and analyzes data for specific patterns or trends.

BeyondNow Technologies, a Cerner Company, provides innovative solutions to the home care industry. ***HomeWorks®*** is a complete front- and back-office home care information management system. ***RoadNotes®*** enables users to extend complete patient information from the point of care to the back-office system.

Financial and Operational Solutions

Clinically Driven Revenue Cycle™ solutions encompass the entire revenue cycle, from scheduling and registration, through healthcare delivery, through billing and customer service. The solutions automatically capture clinical events as they occur, optimizing revenue and reimbursements.

Access Management

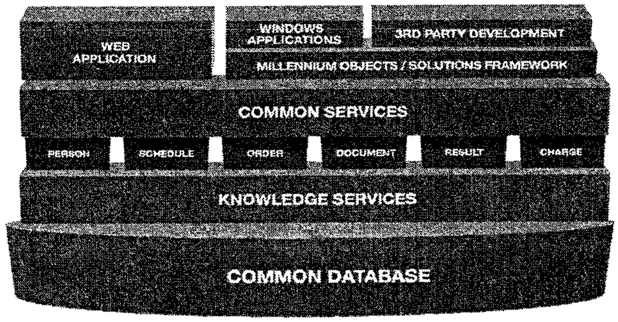
- ☐ ***CapStone® Enterprise Master Person Index*** provides a central repository for the storage of person data. Using advanced identity logic, the EMPI creates a single record by coordinating and reconciling incoming demographic data.
- ☐ ***CapStone® Enterprise Scheduling Management*** erases departmental boundaries to create a single, enterprise-wide scheduling system. It offers medical necessity checking, eligibility verification and integrated clinical orders.
- ☐ ***CapStone® Enterprise Registration Management*** streamlines processes by collecting all information associated with individuals and their encounters once, then making that data available throughout the enterprise.
- ☐ ***CapStone® Enterprise Eligibility Management*** manages care against approved payor services by verifying covered procedures before performing services.
- ☐ ***CapStone® Enterprise Benefits Management*** improves reimbursement by proactively managing covered patient care against real-time health plan benefits.

Health Information Management

- ☐ ***ProFile® Health Information Management System*** offers advanced functionality (coding, abstracting, completion management, release of information) that supports paper charts, scanned documents and electronic health records within a single application.
- ☐ ***Medical Transcription Management*** offers unprecedented levels of accuracy and efficiency of transcribed documents by leveraging clinical data to auto-create report content.

Patient Financial Services

- ☐ ***ProFit® Enterprise Billing and Accounts Receivable System*** for patient accounting and financial management brings together financial and clinical data to maximize reimbursement, decrease denials and gain operational efficiencies.



Cerner Millennium unifies clinical and financial processes through common services and a single data repository that span the entire healthcare continuum.

Clinically Driven Resource Planning™ solutions enhance care delivery and optimize the management of labor, supplies and equipment. These solutions redefine supply chain and workforce processes by linking resource requirements to care delivery.

Workforce Management

- ☐ ***Staff Scheduling*** allows organizations to optimize personnel resources and dramatically reduce the time and effort required to create schedules and perform day-to-day staffing activities.
- ☐ ***Acuity and Workload Management*** aligns clinician skills with patient needs through complete access to the credentials of available resources. The solution captures classification- and workload-related data as part of the permanent medical record.
- ☐ ***Workload Outcomes*** drives continuous staffing improvement based on clinical, financial and service outcomes. The solution provides insight into the relationships between staffing levels, patient safety and outcomes, enabling performance analysis.

Supply Chain Management

- ☐ ***ProCure™ Enterprise Supply Chain Management*** solutions eliminate variation and clinical staff burden. By connecting materials management and clinical processes, the supply chain becomes a byproduct of care delivery.
- ☐ ***Clinical Supply Chain*** eliminates variation and clinical staff burden through a continuous replenishment process. Increased visibility enables organizations to identify and analyze clinical behavior and supply usage.

Enterprise-Wide Operational Solutions

- ☐ ***PowerInsight®*** is a comprehensive healthcare intelligence and data warehouse solution. Web-based access, high-level "dashboard" formats, standard report templates and ad-hoc reports facilitate data review, enabling executives to measure, monitor and improve outcomes.
- ☐ ***Cerner ProVision™ Document Image Management System*** eliminates paper, enhances workflow, reduces costs and avoids duplication of databases, print functions and security across Cerner's clinical and financial solutions.

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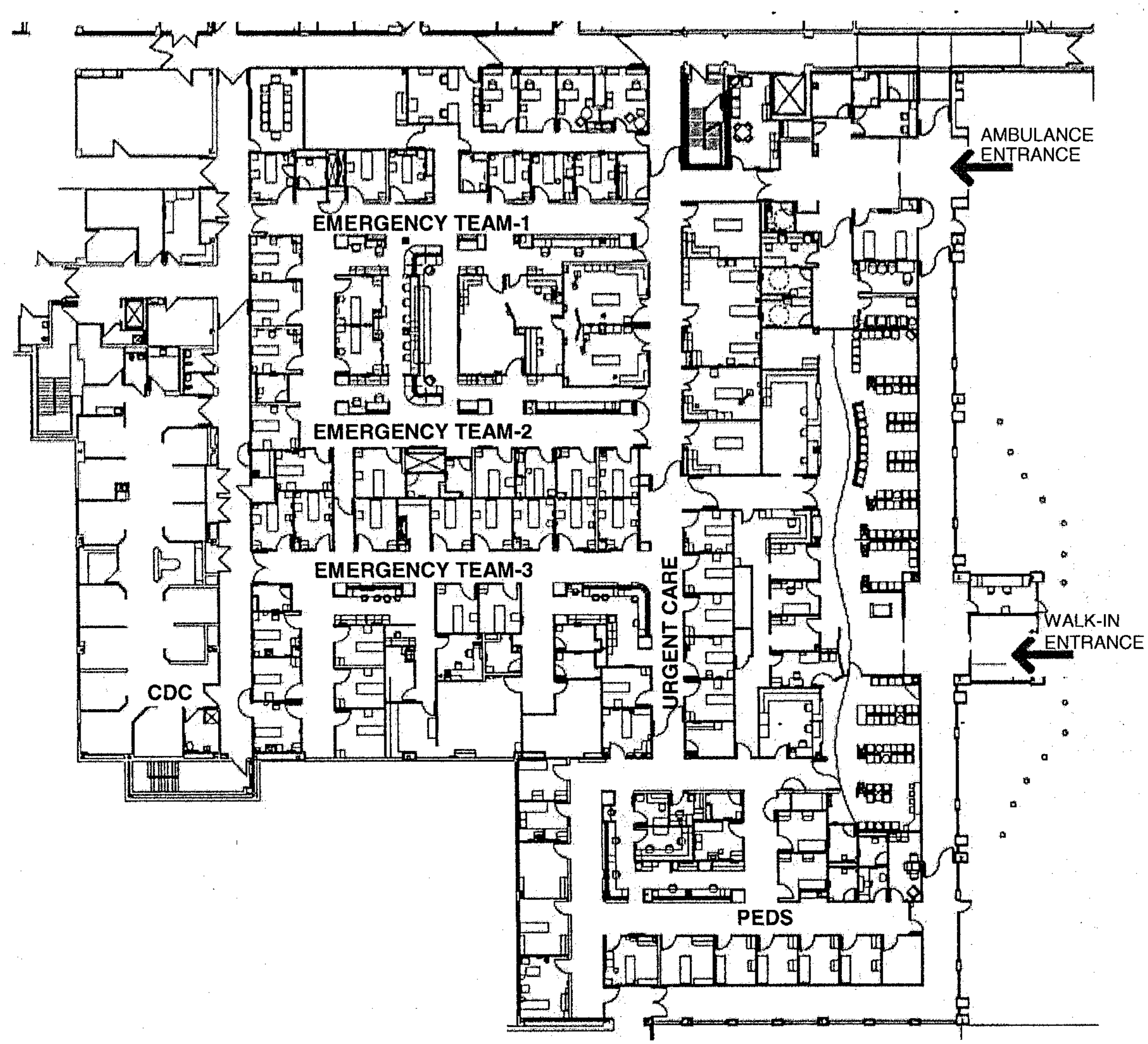
Site Plan Alternative Analysis

D. 2

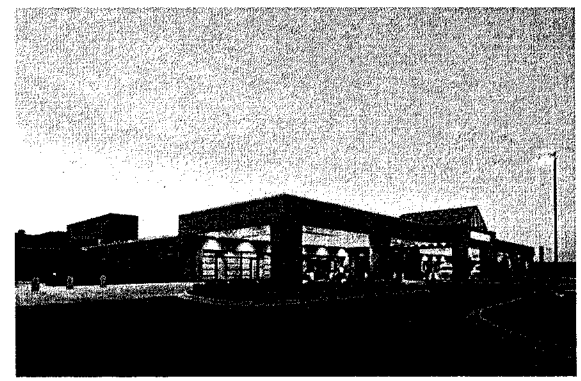
Conditions and Requirements	Alt.1	Note Average	Ponderacidn	Final Points	Alt. 2	Note Average	Ponderacidn	Final Points	Alt.3	Note Average	Ponderacidn	Final Points
FUNCTIONALITY		3,3	0,30	1,0		2,6	0,30	0,8		4,6	0,30	1,4
Integration of Group	4,5				3,0				5,0			
Time/Distance Critical Point	5,0				2,0				5,0			
Time/Distance Cold Function Clinical	3,0				2,5				5,0			
Time/Distance Cold Function Non Clinical	3,0				2,5				4,0			
Time/Distance Clients	3,0				2,5				5,0			
Relationships Between Services	5,0				3,0				5,0			
Security of Installions	4,0				0,0				5,0			
Minor Interference with H Existing During Construction	0,0				2,5				5,0			
Flexibility	2,5				4,0				3,5			
Future Expansions	2,5				4,0				3,5			
COST		2,6	0,50	1,29		2,9	0,50	1,4		4,8	0,50	2,4
Occupancy	4,0				5,0				5,0			
M2 to Construct	5,0				5,0				3,5			
M2 to Remodel	0,0				0,0				5,0			
Transfers & Demolitions	0,0				4,0				5,0			
Time of Construction (phases)	0,0				4,0				5,0			
M2 Circulations	5,0				0,0				5,0			
Economics in Installations	4,0				2,0				5,0			
Use of Floor Space		4,3	0,10	0,43		4,7	0,10	0,5		3,7	0,10	0,4
Availability	4,0				5,0				4,0			
Occupation	4,0				5,0				4,0			
Better Commercialization	5,0				4,0				3,0			
Accessibility		4,9	0,05	0,25		3,3	0,05	0,2		4,0	0,05	0,2
Roads	5,0				3,0				4,0			
Emergency	5,0				4,0				3,0			
Patients	4,5				3,5				5,0			
Services	5,0				3,0				4,0			
Security	5,0				3,0				4,0			
Image of Complex		3,3	0,05	0,17		1,8	0,05	0,1		4,0	0,05	0,2
Architectural Unit	4,5				3,0				5,0			
Synergy	4,0				0,0				5,0			
Infrastructure Quality	3,0				3,0				5,0			
Impact in City	5,0				3,0				5,0			
Average Note		3,7				3,0				4,2		
Final Points				3,10				2,9				4,5
Name												
Total	104,5				85,5				130,5			

Emergency

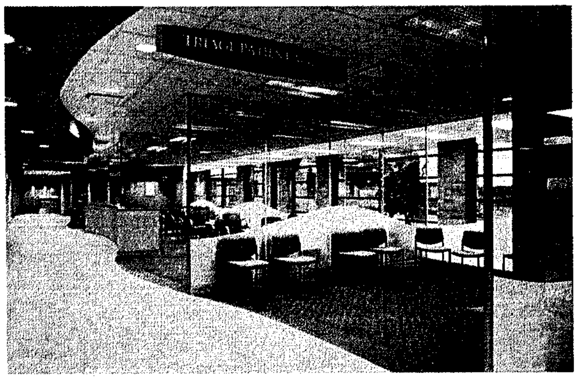


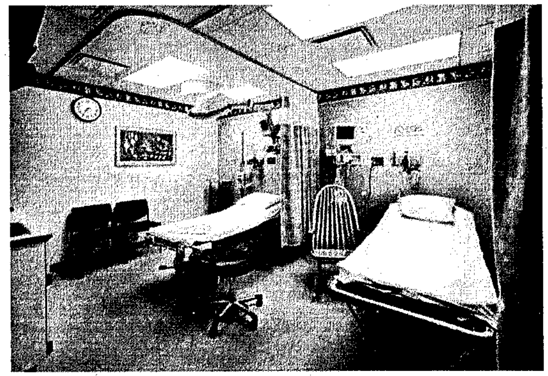
Emergency Department

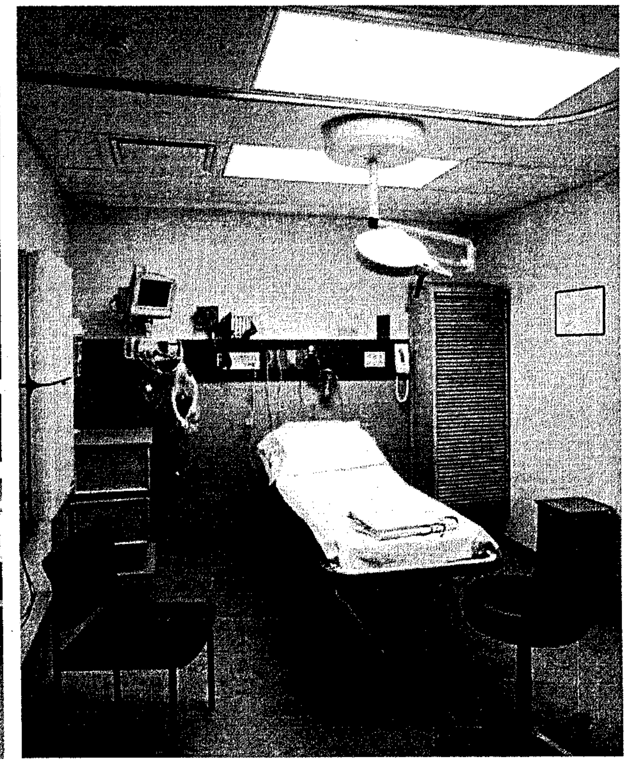
Saint Joseph Mercy Health System
Ann Arbor, Michigan



Emergency

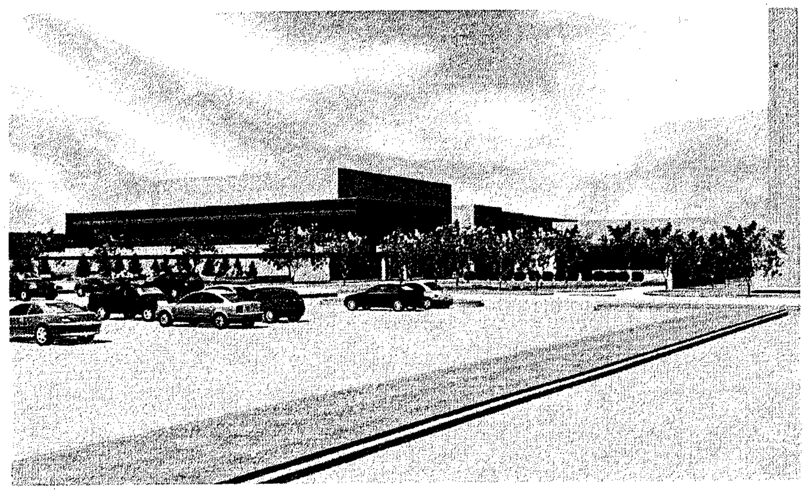


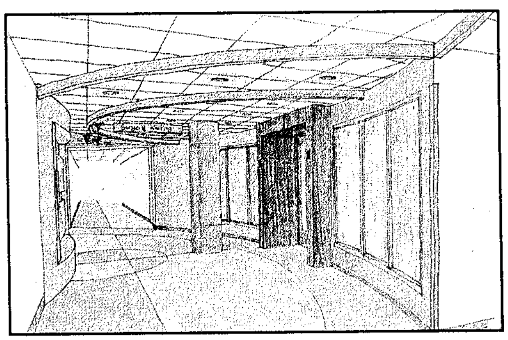




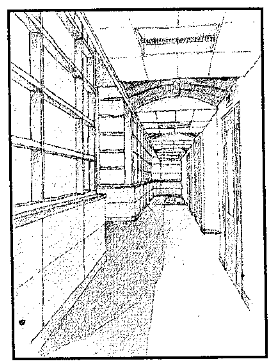
Saint Joseph Mercy Health System
Ann Arbor, Michigan

Comprehensive Surgical Unit

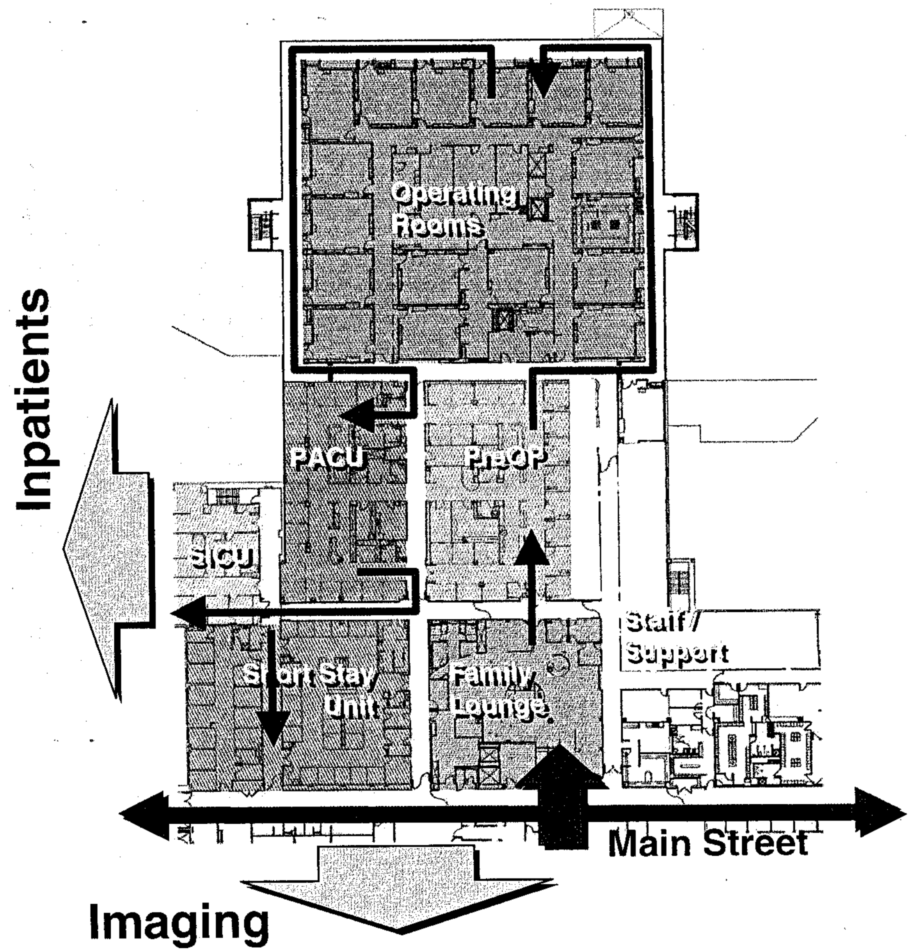




Surgery Entry @ Woodward

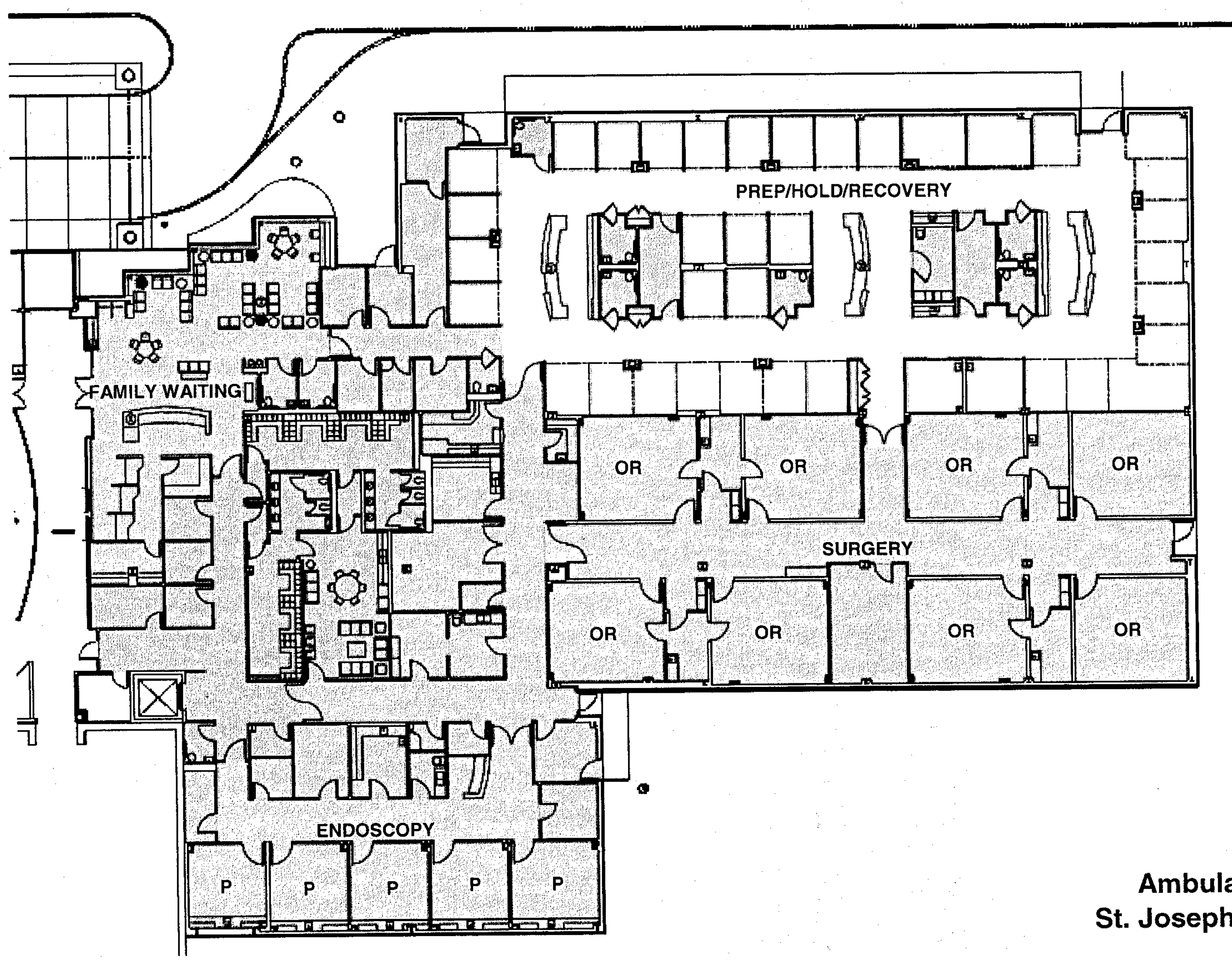


Surgery Corridor



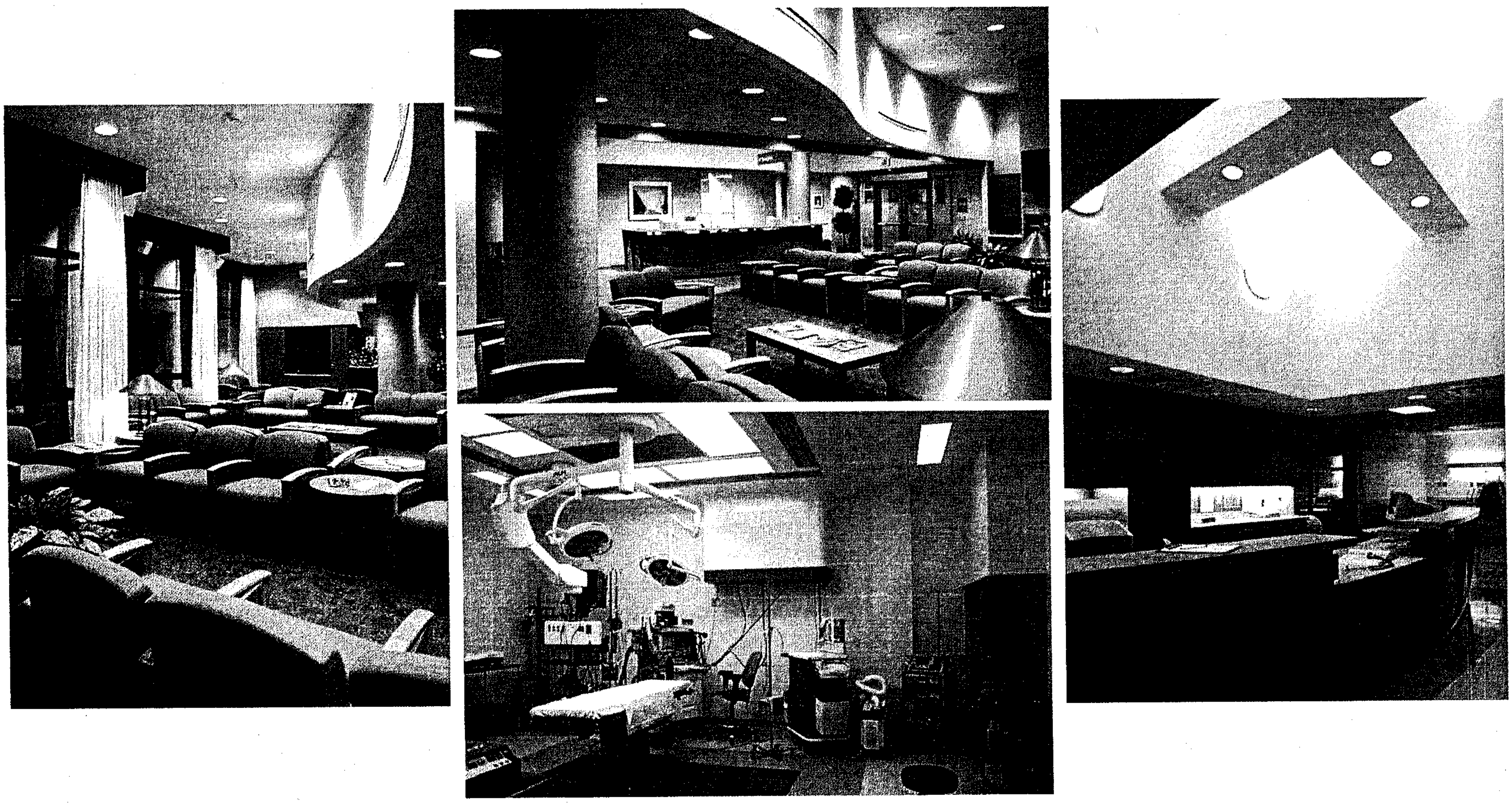
Surgery Addition
Saint Joseph Mercy Health System

Surgical and Medical Procedures Unit



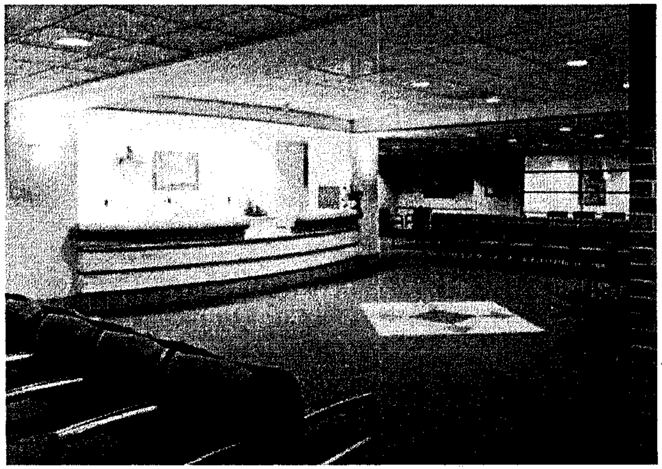
Ambulatory Surgery Center
St. Joseph's Mercy of Macomb

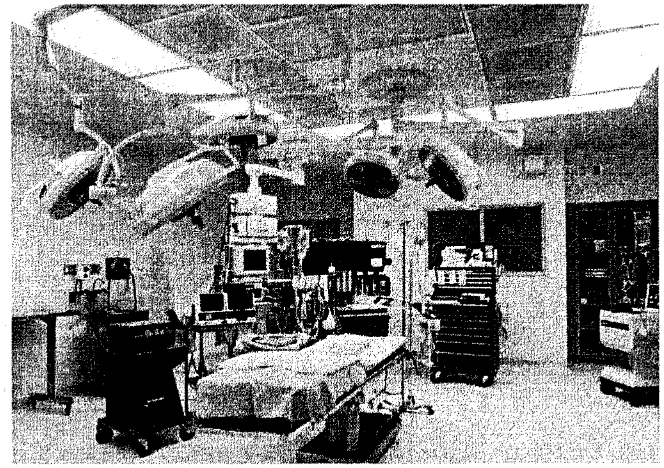
Surgery and Medical Procedures Unit

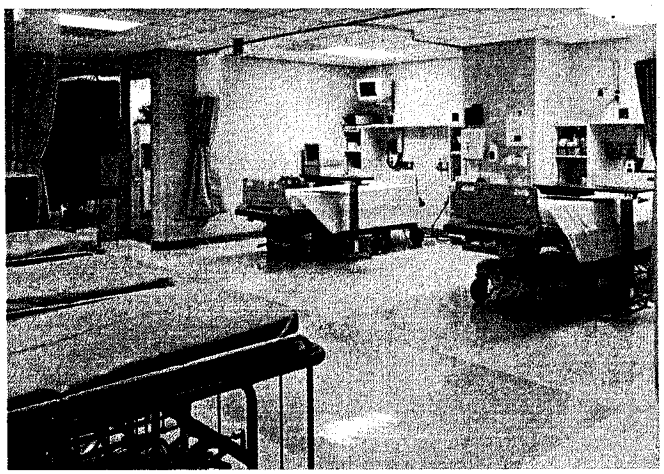


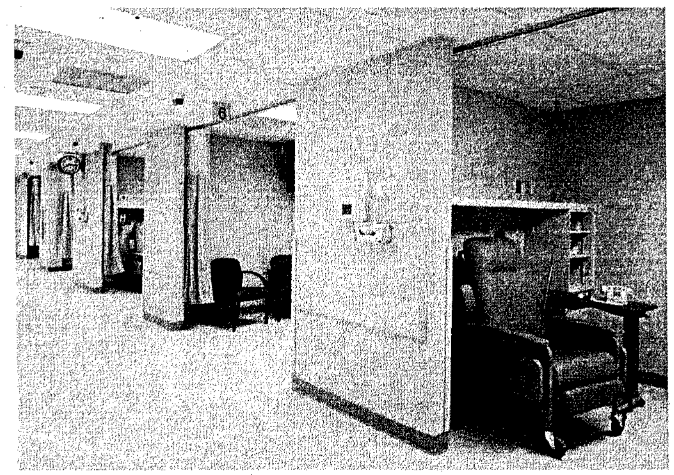
Ambulatory Surgery Center
Saint Joseph's Mercy of Macomb

Surgery



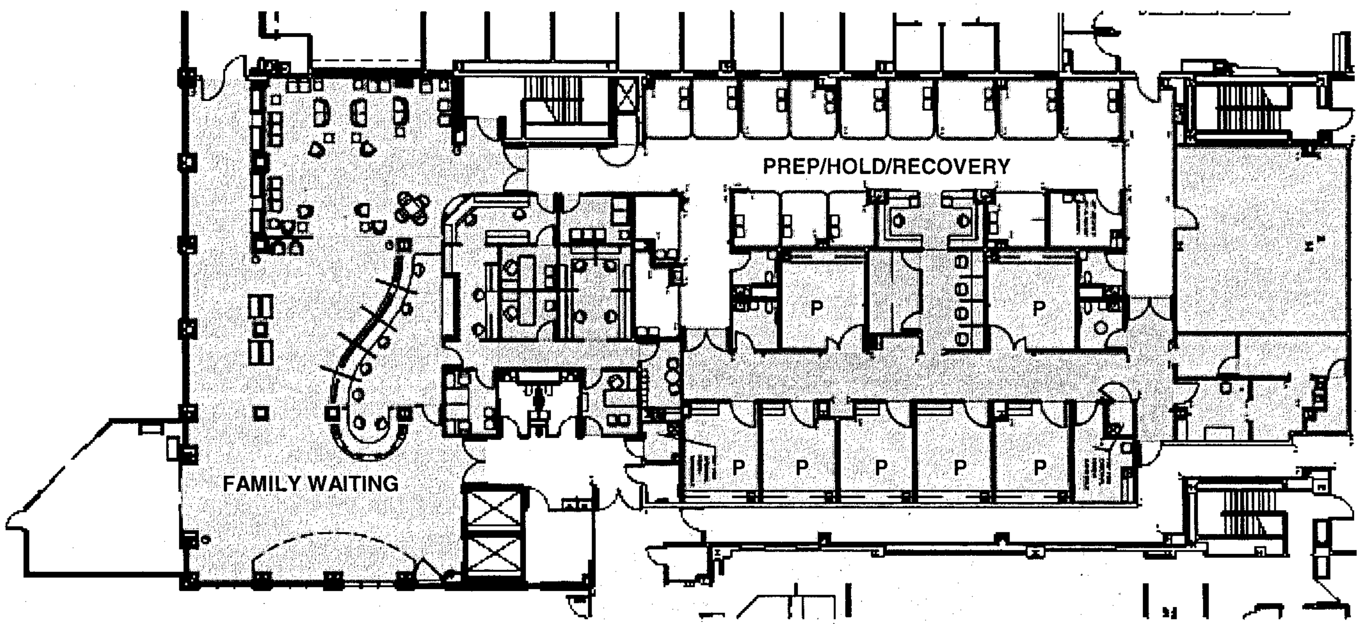






Ambulatory Surgery Addition/Renovation
Mercy Medical Center - North Iowa

Medical Procedure Unit

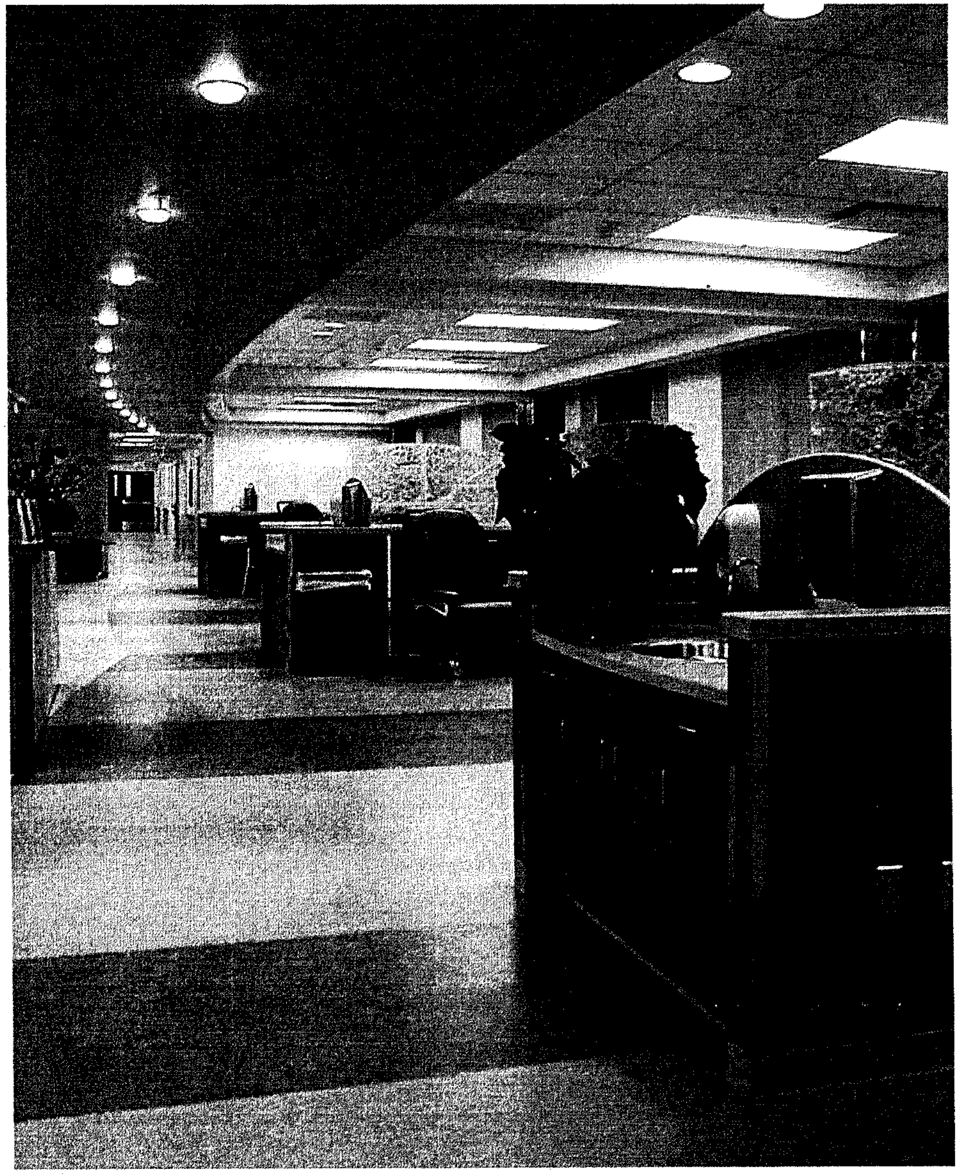


Clinical Services Expansion
Saint Joseph Mercy Health System

Medical Procedure Unit

Clinical Services Expansion: First and Second Floor
Saint Joseph Mercy Health System

Infusion Center



Appendix E.1

Technologies Related to AUGE Standards

Disease Group	Type of care	Technology used
1. End-stage Chronic Kidney Failure	Hemodialysis, Transplantation	Dialysis system, immunosuppressive medications
2. Operable Congenital Heart Disease	Minimally-invasive Interventional Cardiology	Cardiac Catheterization Lab, Imaging, Hemodynamic Monitoring, Minimally Invasive Surgery (MIS)
3. Child Cancer	Early Diagnosis & Treatment, Chemotherapy, Radiation Therapy, Surgery	Chemo Infusion, Linear Accelerator (LINAC), MIS Suite, Drug Therapy
4. Cervical/Uterine Cancer	Early Diagnosis & Treatment, Chemotherapy, Radiation Therapy, Surgery, Cryotherapy, Brachytherapy	Routine Patient Testing (PAP Smears), Infusion, LINAC, MIS, Cryotherapeutic Devices, Brachytherapy Afterloaders
5. Pain Relief in Advanced Cancer	Palliative Analgesia	Analgesic Pharmaceuticals, Surgical Nerve Blockage, Analgesic Spinal Implant Devices
6. Acute Myocardial Infarction (MI)	Early Diagnosis & Treatment, Minimally-invasive Interventional Cardiology	Cardiac Monitoring/Observation in Emergency Department (ED), Prompt Treatment Post-MI (e.g., streptokinase infusion), Cardiac Catheterization Lab, Imaging, Hemodynamic Monitoring
7. Type 1 Diabetes	Prompt Diagnosis, Patient Education, Blood Glucose Control	Training for ED/Triage Personnel, Insulin by Pump or Injection, Blood Chemistry Analysis, Patient-Worn Devices to Aid Blood Circulation to Extremities

8. Schizophrenia	Early Diagnosis & Treatment, Patient/Family Education	Training for ED/Triage Personnel, Psychiatric Counseling, Drug Therapy
9. Breast Cancer	Early Diagnosis & Treatment, Patient Education, Chemotherapy, Radiation Therapy, Surgery, Brachytherapy	Routine Mammography, Promotion of Frequent Self-Examinations, Stereotactic Breast Biopsy, Chemo Infusion, LINAC, MIS Suite, Drug Therapy (e.g., tamoxifen), Brachytherapy Afterloaders
10. Testicular Cancer in Adults	Early Diagnosis & Treatment, Chemotherapy, Radiation Therapy, Surgery	Chemo Infusion, LINAC, MIS Suite, Drug Therapy
11. Lymphomas in Adults	Early Diagnosis & Treatment, Chemotherapy, Radiation Therapy, Surgery	Chemo Infusion, LINAC, MIS Suite, Drug Therapy
12. Cataract in Individuals Aged over 15	Ocular Lens Replacement	Phacoemulsifiers
13. Hip Arthritis Requiring Total Endoprosthesis in Adults Aged 65 or Older	Surgery, Infection Control, Physical Rehabilitation	Surgical Suite with Controlled (Laminar) Airflow, Post-Operative Antibiotic Therapy, Physical and Occupational Therapy
14. Scoliosis Requiring Surgery in Individuals Aged 25 or Younger	Early Diagnosis & Treatment, Surgery, Physical Rehabilitation	Training for ED/Triage Personnel, MIS Suite, Physical Therapy
15. Operable Spinal Sysraphism	Early Diagnosis & Treatment, Surgery, Physical Rehabilitation	MIS Suite, Physical and Occupational Therapy
16. Cleft Lip and Palate	Surgery (Corrective and Cosmetic), Speech Rehabilitation	MIS Suite, Speech Therapy
17. HIV/AIDS	Public Education, Prevention, Drug Therapy, Palliative Care	Promotion of Preventive Measures (e.g., condom use, education regarding clean needles if IV drug abuse cannot be prevented), Use of Anti-Retroviral Drugs, Hospice Care for Terminal Patients

Appendix E.2

Important Medical Technologies

The following medical technologies have been identified as important to implementation of AUGE initiatives, and to improving operations in both Santiago and Concepcion. This section will address only those recommendations that involve medical devices, and will not address issues such as staff training and public education.

1. **DIALYSIS**
   Description: Dialysis is a method for removal of toxic materials from the blood for those with impaired kidney function. The primary treatment for patients with end-stage renal disease is hemodialysis using dialysis machines. These machines provide a bypass circuit for the patient's blood which routes the blood past a semi-permeable membrane. Toxins are drawn from the blood through the membrane by a dialysate solution on the opposite side of the membrane from the blood.
   Design/Engineering Considerations: Hemodialysis is typically performed in an outpatient clinical setting, preferably in an area that is serene and comfortable for the patient. The patient is typically seated in a recliner chair, with the hemodialyzer nearby. The hemodialyzer requires normal electrical power and a source of purified water. The most common methods for water purification are reverse osmosis and distillation.
   Representative Vendor: Baxter (Renal Division)

2. **CARDIAC CATHETERIZATION**
   Description: Cardiac catheterization involves the insertion of a flexible tube (catheter) into the patient's heart, usually by way of a major vessel such as the femoral vein. Fluoroscopy is used to visualize the procedure, and a contrast agent is typically injected through the catheter to aid in viewing functional components of the heart, the path of blood flow through the heart, and the heart's cardiovascular system. Cardiac catheterization is also used for therapeutic procedures such as opening blocked cardiac arteries.
   Design/Engineering Considerations: Cardiac catheterization labs (cath labs) are typically about the size of operating rooms and require a high level of cleanliness due to the invasive nature of the procedure. Since cath labs usually include a fixed C-arm, they also have structural, electrical, and x-ray shielding requirements similar to radiographic/fluoroscopic rooms found in Radiology departments.
   Representative Vendor: GE Medical Systems

3. **MINIMALLY INVASIVE SURGERY**
   Description: Minimally invasive surgery (MIS) is a general term for surgical techniques which minimize the size of the incision used to access the target surgical area. MIS is preferable to traditional (open) surgical techniques because of reduced trauma, pain, scarring, and risk of infection for the patient. In most cases, MIS involves the use of rigid tubes (endoscopes) which are inserted through incisions much smaller than those required for open surgical procedures. Intense light, usually produced by a xenon light source, is passed through one channel of the endoscope to illuminate the target area. An image of

the area is transmitted back through the endoscope to a video processor, which is used to manipulate, magnify, and display the image on a video monitor. Cutting, suturing, electrocautery, and other surgical techniques are performed using specialized instruments that are inserted through one or more separate incisions of similar size (3-10 mm). MIS generally requires more physical dexterity and hand-to-eye coordination, on the part of the surgeon, than open procedures. Not all surgical procedures can be performed with MIS techniques, but the list is steadily growing. Laparoscopic (abdominal), gynecologic, and arthroscopic procedures were among the first to be performed using MIS. In recent years, thoracoscopic techniques have been developed to perform bypass grafts and other corrective procedures on the beating heart.

Design/Engineering Considerations: Equipment components which are essential to MIS include an inventory of endoscopes, videoprocessors and light sources (sometimes combined in a single box), and video monitors. Procedure-specific devices are also required, such as insufflators for laparoscopy and irrigators for arthroscopy. These equipment components can be mounted on a mobile cart which resides near the surgical field during procedures. Carts provide the simplest and least expensive mounting solution; however, ceiling-mounted booms are a desirable alternative because they increase available floor space, reduce wiring clutter, and allow greater equipment maneuverability. Ceiling booms are much more expensive than carts, require extensive structural support, and require electrical conduit and gas piping to be routed above the OR ceiling.

Endoscopes and certain other MIS instruments are typically heat-sensitive and must be sterilized using low-temperature methods (discussed below).

Representative Vendor (Videoendoscopy): Stryker

Representative Vendors (Ceiling Booms): Steris, Stryker

4. LOW TEMPERATURE STERILIZATION

Description: Low temperature sterilization has been used in hospitals for many years to process items which are sensitive to the heat, pressure, and/or moisture used by steam sterilizers. The recent dramatic rise in MIS procedures, with its associated heat-sensitive instruments, has increased the importance of low-temperature processing. Some of the first low-temperature sterilization methods, still in use today, include ethylene oxide gas (EtO) and liquid chemical agents such as glutaraldehyde. More recent developments include the Steris System One, specialized for processing endoscopes and related accessories, and the STERRAD plasma system for more general-purpose sterilization. Each methodology has its advantages and disadvantages. EtO is considered a very reliable method which has been used effectively for many years. It is very toxic to humans, although modern devices minimize the risk of exposure. Perhaps the most significant disadvantage to EtO is the long aeration time required; the usual result is that items processed with EtO can only be used once every day.

Glutaraldehyde is also toxic to humans; it also requires long exposure times and elevated temperatures to function as a true sterilant. For this reason, glutaraldehyde is not often used today to sterilize surgical items. It is commonly used in GI Labs, however, in closed-system processors to provide high-level disinfection for flexible endoscopes.

The Steris System One has become extremely popular in US hospitals for processing rigid endoscopes. With a processing time of about 45 minutes, the System One can process endoscopes between surgical cases, allowing an endoscope to be used several times per day and reducing the total inventory of endoscopes required. The primary disadvantage is that endoscopes emerge wet from the System One, suitable for immediate use but not for wrapping and storage.

The STERRAD plasma sterilizer uses hydrogen peroxide gas excited to a plasma state by radiofrequency stimulation. It processes a wide variety of goods, including wrapped instruments and items sensitive to moisture, in about one hour. Disadvantages include the requirement for goods to be completely dry, and questionable effectiveness in penetrating long, narrow lumens found in many endoscopes.

Design/Engineering Considerations: EtO systems have extensive utility requirements, including electrical, ventilation, and plumbing. In the US, many states require EtO to be processed into non-toxic components before being exhausted into the atmosphere.

The Steris System One is a countertop or cart-mounted item with electrical and plumbing requirements. The agent used (peracetic acid) is relatively harmless to humans and is typically connected to a common drain.

The STERRAD plasma sterilizer, manufactured by a division of Johnson & Johnson, is a movable floor-mounted unit with the only utility requirement being electrical (208 volt, 3 phase in the US). There are no ventilation requirements, as the only emissions to the room are small amounts of oxygen and water vapor.

Representative Vendors: Steris (EtO, System One), 3M (EtO), Advanced Sterilization Products (division of J & J, manufactures STERRAD plasma sterilizer).

5. **CHEMOTHERAPY**

Description: Chemotherapy is a treatment for cancer that involves the infusion of cytotoxic chemical agents. The agents are intended to kill malignant cells while causing minimal damage to non-malignant cells.

Design/Engineering Considerations: The procedure is usually performed in an environment similar to that described above for hemodialysis. An infusion pump may be used to deliver the agent, and patient vital signs are often monitored.

Representative Vendors: Chemotherapeutic agents are provided by a number of small and large pharmaceutical companies in the US and worldwide.

6. **LINEAR ACCELERATORS**

Description: Linear accelerators (linacs) are large devices which provide a means of treating cancer by delivering radiation in controlled doses to a tightly-defined region. Some linacs can provide electron-beam therapy, preferable for certain cancers, in addition to irradiation with x-rays. Modern cancer treatment regimens often utilize radiation therapy in combination with chemotherapy and/or surgery.

Design/Engineering Considerations: Linacs have extensive site requirements, including a large room which must be heavily shielded for radiation, usually with thick concrete. Linacs are heavy consumers of high-voltage electrical power, and thus emit considerable heat. Due to the extreme weight of the concrete shielding and the equipment itself, linacs are usually located on grade.

Representative Vendor: Varian Medical Systems

7. **BRACHYTHERAPY**

Description: Brachytherapy is another method for delivering radiation therapy in the treatment of cancer. Brachytherapy uses small pellets of radioactive material which are implanted in or near the tumor and typically left in place for about a year. The pellets, smaller than a grain of rice, are often implanted using a device called an afterloader, which provides radiation protection for the clinician and aids in precisely placing the pellets The procedure is usually performed on an outpatient basis and takes about an hour. Brachytherapy is most commonly used to treat cervical, breast, and prostate cancer; it can also be used to treat mesothelioma.
Design/Engineering Considerations: The primary design consideration is highly secure and highly shielded storage for the radiation sources. Radiation shielding is also recommended for the room in which implantation is performed.
Representative Vendors: Varian Medical Systems, Nucletron Corporation

8. **CRYOTHERAPY**

Description: Cryotherapy is a method for destroying diseased tissue (usually cancerous or pre-cancerous) by freezing the tissue. The technique typically uses a probe that is inserted into the tumor or applied to the surface of a lesion. The probe is cooled by liquid nitrogen circulating through it. The amount of tissue destroyed is controlled by the length of time the probe is left in place. Cryotherapy is used to treat cervical and prostate cancer, as well as certain types of brain lesions.
Design/Engineering Considerations: Cryotherapy is usually performed as an outpatient surgical procedure. The device itself is portable and requires only a normal electrical connection.
Representative Vendor: Boston Scientific

8. **CASE CART SYSTEMS**

Description: The implementation of a case cart system is more an operational change than an adoption of new technology. A case cart system can enable a centralized sterile processing department to support one or more surgery departments that may be some distance away. Surgical instruments are cleaned, inspected, wrapped, terminally sterilized, and placed into a closed mobile cart at a central location. The individual carts may then be staged for some time at the central location, or transported immediately to the appropriate surgical location, with instrument sterility intact. After surgery, the soiled instruments are re-loaded onto the carts, then transported back to the central sterilization area.

There are several advantages to centralization of sterile processing operations. Among these are standardization of processing techniques and consistency of staff training. Duplication of expensive equipment (washer/decontaminators and sterilizers) can be reduced, and equipment maintenance made more consistent. With a computerized inventory control system, the overall surgical instrument inventory can be reduced substantially.

Design/Engineering Considerations: The implementation of a case cart system can have an impact on workflow through the central sterile department. This is especially true if the system is applied to a pre-existing installation that has not used case carts before. Space must be allocated for the staging of soiled carts as well as clean carts; as always, separation should be maintained between "clean" and "soiled" zones of the department.

Automated cart washers provide a fast and efficient method for cleaning the carts themselves, but are not essential to the function of a case cart system. Cart washers take up substantial space and require extensive utilities, including electrical, plumbing, steam, and ventilation.
Representative Vendor (Case Carts): Metro Industries
Representative Vendor (Cart Washers): Steris

9. **MAMMOGRAPHY AND STEREOTACTIC BREAST BIOPOSY**

Description: Routine mammography has long been considered the best method for early detection of breast cancer. Mammography is performed with a specialized radiographic unit, using relatively low doses of radiation to image breast tissue. Mammography can detect extremely small tumors, before they are large enough to be felt manually.

Stereotactic breast biopsy is performed using a modified mammography unit. This procedure uses multi-angle visualization to provide precise positioning of the biopsy needle within a lump or mass that has been detected in the breast tissue. Stereotactic biopsy devices reduce scarring and trauma for the patient, provide a more reliable biopsy sample, and reduce the need for repeat biopsies.

Design/Engineering Considerations: The electrical utility requirements for stereotactic breast biopsy are similar to those for mammography, but a slightly larger room is required.
Representative Vendor: GE Medical Systems

10. **MULTIDETECTOR COMPUTED TOMOGRAPHY (MDCT)**

Description: An evolution of computed tomography, the use of multiple x-ray detectors allows images to be acquired in less time than previous, single-detector systems. The technology began with 4, then 16 detectors; recently, 64-detector systems were introduced. Studies performed using MDCT are less prone to motion artifact, enabling better resolution of anatomical structures and improved imaging of the heart and other moving organs. MDCT is expected to surpass fluoroscopy as the modality of choice for diagnostic cardiac imaging.

Design/Engineering Considerations: An MDCT system resides in the same space as a single-detector CT, with similar utility requirements. MDCT studies generate larger digital image files than single-detector studies, resulting in greater bandwidth demands on the PACS system and network.
Representative Vendor: GE Medical Systems

Appendix E.3
Assessment of Existing Medical Technology Assets

In addition to equipment inspection and interview processes, objective comparative analysis tools can be employed to assist in the appropriate identification and prioritization of technology needs. Specifically, three types of comparisons are used:

- External Industry Benchmarking (applies to all clinical/imaging assets)
- External Peer Group Benchmarking (applies only to imaging assets)
- Internal Benchmarking (applies only to imaging assets)

<u>External Industry Benchmarking</u>
The technological condition of each asset is assessed by comparing to current industry state-of-the-art standards. A "Technology Quotient (TQ)" rating is assigned to reflect this condition.

For all equipment assets other than diagnostic imaging systems, the TQ is a simple 5-scale rating based on the following broad definitions:

- 5 – Current, premium-level state-of-the-art design
- 4 – Near state-of-the-art; incremental "drop-off" in some features/capabilities.
- 3 – Mature design; lacks latest state-of-the-art features; still clinically acceptable
- 2 – Marginal technology; approaching obsolescence
- 1 – Clinically or technically obsolete; no longer supportable; possibly harmful

For imaging systems, the TQ is actually a ratio of technological level (proximity to current industry state-of-the-art) to system age. The range varies by modality, from a high of 10 (for CT scanners) to a low of 4 (for portable x-ray units).

For ease of reading written reports, the TQ assigned to each asset may be highlighted in color.
Green indicates TQ ratings that fall within the upper quartile of their assigned range.
Yellow indicates TQ ratings that fall within the middle of their assigned range.
[redacted] indicates TQ ratings that fall within the lower quartile of their assigned range.

<u>External Peer Group Benchmarking</u>
A "peer group" consists of facilities performing a comparable number of annual imaging exams. Average asset age (per modality) is compared to a peer group average, and presented as a percent variant from the peer group average.
Green indicates ages that are significantly *lower* than the peer group average (lower quartile).
Yellow indicates ages that are comparable to the peer group average (mid range).
[redacted] indicates ages that are significantly *higher* than the peer group average (upper quartile).

Average asset utilization (per modality) is compared to a peer group average, and presented as a percent variant from the peer group average.
Green indicates usage that is significantly *lower* than the peer group average (lower quartile).
Yellow indicates usage that is comparable to the peer group average (mid range).
[redacted] indicates usage that is significantly *higher* than the peer group average (upper quartile).

In general, age and usage variants highlighted in red indicate a stronger incentive to react in some fashion (e.g., replace, upgrade or add more equipment).

Internal Benchmarking (applies to imaging assets only)

A "technological competency" score is calculated (per modality) to represent how well each modality is equipped technologically (when compared to a pre-defined "ideal state" for that site), and presented as a percent variant from the ideal (a score of 0).

[redacted] indicates scores that exceed or are closest to the "ideal state" (upper quartile of all scores).
Yellow indicates scores that fall within the mid range of all competency scores.
[redacted] indicates scores that are farthest from the "ideal state" (lower quartile of all scores).

A "clinical significance (local-level)" score is calculated to represent the degree of dependence the department has on a particular asset. (A higher percent of use compared to other assets suggests more dependence / greater significance.)

[redacted] indicates scores that fall within the lower quartile of all scores (lower significance).
Yellow indicates scores that fall within the mid range of all scores.
[redacted] indicates scores that fall within the upper quartile of all scores (higher significance).

A "clinical significance (system-level)" score is calculated to represent the relative importance of a particular modality at a particular site. (A higher percent of exams performed at one site compared to other sites suggests greater site significance.)

[redacted] indicates scores that fall within the lower quartile of all percentage scores (lower significance).
Yellow indicates scores that fall within the mid range of all percentage scores.
[redacted] indicates scores that fall within the upper quartile of all percentage scores (higher significance).

In general, scores highlighted in red indicate a stronger incentive to react in some fashion (e.g., replace, upgrade or add more equipment).

Appendix E.4

Technology Management Program Scope of Services

(Vendor Name) shall provide an on-site resident manager, Monday through Friday during standard shift coverage to perform technology management functions and assure that clinical equipment repairs and planned maintenance are efficiently and effectively performed for the devices listed in Schedules I and II. (Vendor Name) biomedical and imaging technical staff will be assigned as required and as detailed herein. The service needs of (Owner Name) are subject to change almost daily, and (Vendor Name) shall adjust manpower availability to match the Hospital's requirements. Normal Hospital requirements will be planned and staffed accordingly, but there will be occasions where more staff will be necessary and supplied. The capability to flex and share resources between hospitals is a major factor in the desired Technology Management Program. (Vendor Name) will provide reasonable after hours (on call) coverage, seven days per week, 24 hours per day, at no additional cost.

Schedule I includes approximately _________ biomedical/clinical devices located throughout the Hospital's facilities. This inventory, furnished to (Vendor Name) by (Owner Name) will be verified and updated within 90 days of commencement of services. (Vendor Name) will assume maintenance responsibility and financial risk for labor and parts on all equipment listed in Schedule I.

Schedule II includes medical devices located throughout the Hospital's facilities that are currently serviced under contracts with various manufacturers and service organizations. (Vendor Name) will assume responsibility and financial risk on the equipment listed in Schedule II as service contracts are canceled or expire. (Vendor Name)'s coverage and financial risk on this equipment will meet or exceed the current contracted service coverage. Therefore, reviewing and understanding each contract in detail is critical. Service fees will be prorated on a cost basis until (Vendor Name) service actually begins.

All equipment lists are based on information supplied to (Vendor Name) by (Owner Name) and information gleaned during (Vendor Name)'s survey of the Hospital's facilities. (Vendor Name) will extend services to cover ordinary and reasonable additions or replacements from the original inventory.

However, equipment inventory within the Hospital can change daily. Inventory and/or service requirements will be reviewed **monthly** to determine if substantial changes have occurred. Substantial changes are defined as a **5.0 percent increase or decrease** in planned maintenance man-hours required or due to the **addition or deletion** of a single major device/system with a purchase price of ____ or greater or a device with an associated manufacturer full service agreement of ____ or greater. These thresholds often signal the need for staffing adjustments and parts cost over and above those in the original service plan. Such requirements will be documented and (Vendor Name) will review, with the hospital, amendments to the original service plan as appropriate.

Technology Management Program Scope of Services (cont.)

The equipment to be serviced ranges from patient monitoring systems to laboratory devices and imaging systems. Instances may arise when original manufacturer or other third party services are required. The use of outside service parties may be part of the equipment service plan. The decision to use original manufacturers or other third party services will be determined jointly by a (Owner Name) designee and (Vendor Name)'s assigned technology manager. (Vendor Name) will arrange and supervise these activities at its own expense for the covered items.

1.0 <u>Technology Management Services</u>

(Vendor Name)'s technology management program shall include the following services:

- Monitoring of all medical equipment for safety and proper performance. Documentation of testing, according to the schedules required by the regulating agencies. Verify adequacy of the test procedures, proper calibration of the test equipment, and competency of the testing personnel.

- Prompt and competent repair of all medical equipment. Document repair costs. Monitor repair competency and equipment downtime.

- Document lifecycle maintenance costs, equipment performance, and advise on equipment disposal.

- Technical assistance with the evaluation of new medical equipment. Keep staff informed on current advances in medical equipment and new technology.

- Definition of current biomedical safety regulations and standards. Provide an efficient documentation system, including appropriate policies and procedures on how to document work performed by both in-house and outside service personnel.

- Consultation and advice on equipment space layout, design, and utilization.

- Technical assistance with equipment purchase negotiations in regard to training, service and operator manuals, consignment equipment and parts and other concessions.

- Technical support to in-service training of the clinical staff on electrical safety and the safe and proper use of the clinical equipment.

- Provision of an adequate system for processing and ensuring compliance with handling medical equipment hazard notifications.

1.0 Technology Management Services (Cont.)

- Technical support to the facilities safety committee to include a system for monitoring, assessing and reporting medical equipment performance, operational issues, and investigation of equipment-related incidents. Provide technical liaison with the loss control specialists from the facilities liability insurance underwriters.

2.0 Repair Services

(Vendor Name) will provide repair services when notified of equipment failure by (Owner Name)for the equipment listed in Schedule I; and for Schedule II equipment covered by a repair contract when contract cancellation has taken place:

- Service personnel will be available on-site during the standard shifts as determined by the Hospital, Monday through Friday, excluding holidays observed by (Vendor Name) for all devices listed.

- (Vendor Name) will provide reasonable emergency repair services required outside the standard shift coverage at no additional charge.

- Respond to service calls at a mutually agreed upon arrival time consistent with good patient care practices.

- Notify the department manager about each repair request that must be delayed because of parts procurement problems, priority problems, etc.

3.0 Planned Maintenance, Safety Checking and Testing

(Vendor Name) will provide planned maintenance inspections when scheduled and safety testing as needed during the standard shifts as determined by the Hospital, Monday through Friday, excluding holidays observed by (Vendor Name). The program will include:

- Recognition that patient care requires the scheduling of some planned maintenance activities outside of standard shifts. Such reasonable services for specialized equipment will be provided.

- Preventive maintenance, routine, rigorous safety testing and systems performance verification to minimize inherent risk. Test intervals are established based on requirements outlined by the equipment manufacturer and the critical function of the equipment. (Vendor Name) shall use the manufacturers' operational and maintenance manuals in conjunction with inspection guides developed by (Vendor Name).

3.0 Planned Maintenance, Safety Checking and Testing (Cont.)

- Processes to meet and exceed regulatory requirements. The program shall be designed to provide a comprehensive equipment control program that will optimize the life and value of the equipment, provide equipment operations as intended by the manufacturing design and minimize inherent risk.

- Provision of a periodic inspection schedule for each item of equipment to be maintained. The inspection process will include periodic replacement of parts.

4.0 Documentation

(Vendor Name) shall provide and maintain a software and support package for maintenance management. The system shall provide for workload management and planned maintenance scheduling, on-going equipment histories and analysis, time summary analysis, maintenance of inventory and more. The system shall allow for maximum effectiveness and simplicity in operation. Commonly requested reports shall be accessible through user-friendly menus and prompts.

5.0 Replacement Parts

(Vendor Name) will supply at its own expense all necessary replacement parts for the equipment listed in Schedules I and II, except those excluded in the current service contracts (see individual contracts for exclusion):

- All parts will be new, standard parts or parts of equal quality.

- Exchange parts removed from the equipment shall become the property of (Vendor Name).
- Parts replacement includes those items other than accessory or consumable items and items currently or previously offered for sale in manufacturers' equipment price books. Replacement parts are required because of normal wear and tear or otherwise deemed necessary by (Vendor Name).

- The appropriate inventory level of replacement parts will be maintained by (Vendor Name) and replenished as used.

5.0 Replacement Parts (Cont.)

- At the Hospital's option, (Vendor Name) will document the spare parts and test equipment inventory currently on site and in consultation with the hospital assign a value to the spare parts and test equipment inventory. (Vendor Name) will purchase the inventory from the hospital at the value agreed upon by the hospital and (Vendor Name).

6.0 (Owner Name) Responsibilities

(Owner Name) will provide the following in support of the technology management program:

- Establish Technology Management as a separate department. The technology manager will have all the rights and privileges due a department head. The program is anticipated to perform and conduct business within the facility as does any other department.

- Agree to allow (Vendor Name) to act as its duly authorized representative in obtaining services, support, parts and other technical information from the manufacturers of equipment within the facility.

- Inform (Vendor Name) through the technology manager of all procurement and disposal of medical equipment in order to assist performance and record keeping.

- Require of all vendors two copies of wiring diagrams, schematics, service manuals and other technical literature as a condition of the Hospital's purchase of new medical equipment.

- Provide reasonable workspace, clerical support, telephone services, and other supplies and services necessary for provision of services pursuant to this Agreement.

- Appoint a representative to serve as continuing liaison between (Vendor Name) and (Owner Name) pursuant to the performance and provision of services.

TRINITY HEALTH INTERNATIONAL

A MEMBER OF TRINITY HEALTH

CONTRACTOR INFORMATION

CHILE TEAM- Project #87210

NAME	PHONE NUMBER	ADDRESS	E-MAIL
Robert Beyer Team Leader	Office# 248-692-0008 Cell# 248-408-7270 Fax# 248-380-1830	1018 Equestrian Dr South Lyon, MI 48178	rbeyer@prodigy.net
Joyce Durham Architect/Nurse	Office# 248-489-5115	Trinity Design 34605 Twelve Mile Rd. Farmington Hills, MI 48331	durhamj@trinitydes.com
Russ Jones Equipment Planning	Home# 803-327-9431 Office# 704-733-5667 Fax# 704-357-1734	4173 Wesley Woods Dr. Rockhill, S.C. 29732	
Robert Larkin Equipment Planning	Cell# 614-578-2938 Home# 614-449-9795 Fax# 530-239.8865	1799 W. Fifth Ave. Suite 134 Columbus, OH 43212	rhlarkin@earthlink.net
Donald Velsey Architect	Home# 202-338-3784 Fax# 202-333-8599	1423 Foxhall Road N.W. Washington, DC 20007	velsey@mac.com
Pierre Gonyon Waste Management	Work# 734-712-3315	St. Joseph Mercy Health System-Safety Dept 5301 E. Huron River Dr Ann Arbor, MI 48106	gonyonpl@trinity-health.org
Frank Smith IT	Mobile# 574-298-5525 Office# 574-273-1218 Fax# 877-570-5419	51879 Saddle Ridge Ln. Granger, IN 46530	fsmith@abilitainc.com
Douglas Edema, MD Clinical/Medical	Office# 517-545-6701 Fax# 517-545-6192	Saint Joseph Mercy Livingston Hospital 620 Byron Road Howell, MI 48843	edemad@trinity-health.org

TRINITY HEALTH INTERNATIONAL

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PROSPECTIVE U.S. SOURCES OF SUPPLIES

Recommended Vendors
Chilean Ministry of Health Officials

Presented by Trinity Health International

June 14, 2005

The following is a listing of vendors who, based upon the recent Technical Assistance for the Santiago and Concepcion Hospital Renovations Project, Trinity Health International believes would be of value to the Ministry of Health of Chile.

• Cerner Corporation Sites: Cerner Corporation 2800 Rockcreek Parkway Kansas City, MO 64117	Contact Person: Andy Scheib	Telephone # 816-201-2787 Fax # 816-571-5573
• Siemens: Siemens Corporation Citicorp Center 153 East 53rd Street New York, NY 10022-4611	Contact Person: Mike Ritonya	Telephone # (248) 253-8510 Fax # 248-334-4616
• Hill Rom, Batesville, IN: 1069 State Route 46 East Batesville, IN 47006	Contact Person: Florica Haiduc	Telephone # 800-433-6245 Fax # 812-934-1697
• Steris, Erie, PA: Steris Corporation 2424 West 23rd St Erie, PA 16514	Contact Person: Sales Representative	Telephone # 440-354-2600 Fax # 440-639-4450
• Herman Miller 855 East Main Zeeland, MI 49464	Contact Person: Sales Representative	Telephone # 616-654-030
• GE, Milwaukee, Wisconsin: General Electric Company 3135 Easton Turnpike Fairfield, CT 06828-0001	Contact Person: Sales Representative	Telephone # 248-948-5243 Fax # 800-558-7044
• Stryker, Kalamazoo, Michigan: Stryker 2725 Fairfield Road Kalamazoo, Michigan 49002	Contact Person: Aileen Werner	Telephone # 800-669-4968 Fax # 800-329-7879

Agenda primera visita consultores Trinity Health
21 febrero- 4 marzo 2005

Día	Mañana	Tarde
Lunes 21	9:30 Reunión con Dirección del SSMO (Dra Andrea Pobrete, Dr. Héctor Olguín, Jaime Arraigada) 12:00 Reunión con equipo del proyecto CHS-I (Santiago Venegas, Mirna Pino, Luis Osorio, Juan Pablo Sepúlveda, Pedro Martínez, Verónica Medina, Ana María Volosky, Arnoldo Uribe) Presentación PPP en Salud.	15:30 Reunión con el Ministro de Salud (Dr. Pedro García, Santiago Venegas)
Martes 22	9:30 Visita al Hospital del Salvador (Dr. Carlos Altamirano, Director; Dr. Enrique Hering, Sub Director Médico; Verónica Ibacache, Sub Director Administrativo; Mauricio Bustamante, Sub Director de Operaciones) 12:00 Visita al Instituto Nacional del Torax (Dr. Ricardo Quezada, Dr. Jaime Goich, Sub Director Médico, Dr. Dimitrje Pavlov; Liliana Echeverría Sub Directora Administrativa)	15:00 Visita al Instituto Nacional de Neurocirugía. (Dr. Patricio Loayza, Sub Director Médico; Patricio Malinarich, Sub Director Administrativo) 16:00 Vista al Instituto Geriátrico (Dra. Juana Silva, Directora; Dr. Juan Jerez, Sub Director Médico; Iván Gallo, Sub Director Admninistrativo)
Miércoles 23	9:00 Reuniones de trabajo entre especialistas: - Presentación Modelo de Organización y Gestión (Mirna Pino, Santiago Venegas, Juan Pablo Sepúlveda, Verónica Medina) - Presentación proyección demanda de prestaciones (Héctor San Martín, Santiago Venegas, Mirna Pino) - Presentación Modelo gestión	Reuniones de trabajo entre especialistas: - Diagnóstico de Equipamiento clínico e industrial (Verónica Medina) Viaje a Concepción.

	de Enfermería (Verónica Medina) - Modelo de Gestión Clínica del CHS-I (Verónica Medina) 1. - Presentación Diagnóstico de Infraestructura (Pedro Martínez, Ana María Volosky, Arnoldo Uribe) - Presentación TI (Luis Osorio, jefes de informática de los 4 hospitales del CHS-I) 12:00 Reunión en el MOP	
Jueves 24	Visita al Hospital de Concepción	Visita al Hospital de Concepción Retorno a Santiago
Viernes 25	9:00 – 12:00 Visita al Hospital Luis Tisné (Dr. Julio Montt, Arnoldo Uribe, Ana María Volosky, Pedro Martínez; Mirna Pino) Reuniones de trabajo entre especialistas: 12:00 Charla expositiva: cambio organizacional. (Omar Cancino, Jefe RR.HH., Verónica Ibacache, H del Salvador) 12:00 Manejo de residuos. (Pedro Martínez, Arnoldo Uribe) 15:00 Equipamiento industrial. (Verónica Medina, Arnoldo Uribe)	Team debrief
Sábado 26 Domingo 27		**Llega Joyce Durham**
Lunes 28	Robert Beyer, Santiago Venegas, Dr. Jaime Lavados Joyce Durham se reúne con equipo	Joyce Durham trabaja con equipo de Arquitectura (Ana María Volosky, Pedro Martínez, Eric Birchmeier, Hernán Ugarte)

	proyecto (Ana María Volosky, Pedro Martínez, Eric Birchmeier, Hernán Ugarte)	
Martes 1	Joyce Durham trabaja con equipo de Arquitectura (Ana María Volosky, Pedro Martínez, Eric Birchmeier, Hernán Ugarte)	Joyce Durham trabaja con equipo de Arquitectura (Ana María Volosky, Pedro Martínez, Eric Birchmeier, Hernán Ugarte)
Miércoles 2	Joyce Durham trabaja con equipo de Arquitectura (Ana María Volosky, Pedro Martínez, Eric Birchmeier, Hernán Ugarte)	Joyce Durham trabaja con equipo de Arquitectura (Ana María Volosky, Pedro Martínez, Eric Birchmeier, Hernán Ugarte)
Jueves 3	Joyce Durham trabaja con equipo de Arquitectura (Ana María Volosky, Pedro Martínez, Eric Birchmeier, Hernán Ugarte)	Joyce Durham trabaja con equipo de Arquitectura (Ana María Volosky, Pedro Martínez, Eric Birchmeier, Hernán Ugarte)
Viernes 4	Joyce Durham trabaja con equipo de Arquitectura (Ana María Volosky, Pedro Martínez, Eric Birchmeier, Hernán Ugarte)	Debrief Joyce Durham

REUNION DE TRABAJO
CONVENIO U.S.T.D.A - T.H.I.

TEMA: Tecnología de Información

FECHA: 20 Abril

NOMBRE	CARGO	TELEFONO
J.P. Sepúlveda		
I. Astorga		
S. Venegas		
E. Saint Pierre		
L. Osorio		
J. Carrasco		
A. Wagner		
S. Konig		
J. Diaz (MOPTT)		
Luis Jerez (ING)		
Manuel Polete (INCA)		

REUNION DE TRABAJO
CONVENIO U.S.T.D.A - T.H.I.

TEMA: ____________________

FECHA: ____________________

NOMBRE	CARGO	TELEFONO
Andrea Giscard (INT)		
Pablo Piñera (INT)		
Mauricio de la Barra (IKONS)		

REUNION DE TRABAJO
CONVENIO U.S.T.D.A - T.H.I.

TEMA: Modelo de Gestión Clínica

FECHA: 25 Abril, 9:30 hrs

NOMBRE	CARGO	TELEFONO
Dr. Jaime Gorich	I.N.T Sub	dir Médico
Dr. Juan Pérez	Geriatría Sub	dir Médico
Dr. Patricio Herrera	Geriatría	Serv. Geriatría
Ignacio Astorga	CHS-1	
Frank Smith	Trinity	
Joyce Durham	T H I	
Luis Osorio	TI, CHS-1	
Juan Pablo Sepulveda	CHSI	
Irina Pino	CHSI	
Verónica Medina	CHSI Coord	Modelo Enferm
Evelyn Villarán	Hd S	Enf. Unidad Gestión

REUNION DE TRABAJO
CONVENIO U.S.T.D.A - T.H.I.

TEMA: Modelo de Gestión Clínica

FECHA: 25 Abril, 9:30 hrs

NOMBRE	CARGO	TELEFONO
Ruth Hormazábal	Enf Jefe Cardiología HdS	
Carmen Luz Naranjo	I.N.T.	Enf Coordinadora
Sonia Zavala G.	INCA	Jefe SOME
Soledad Estelle	INCA	Enf. Coordin
Lutén Arias	Geriatría	Enf. Coordinad
Douglas Edema	THI	
Robert Beyer	THI	
Santiago Venegas	CHSI	Secret. Ejecutivo
[illegible]		

MON 9:30 AM

NURSING UNITS / CLINICAL MGMT MODEL

Nombre	Cargo
	Coordinador Estudio Preinversión
Ignacio Astorga	
Frank Smith	Trinity
Joyce Dunham, RN, AIA	TI
Luis Osorio	TI ChSI
Juan Pablo Sepúlveda	Human Resources.
Mirna Pino H.	Equipo CHSI
Verónica Medina	Coord. Modelo Enfermería
Evelyn Villalon B.	Enfermera. Unidad Gestión Clínica (GRD)
Ruth Hormazábal B	Enfermera Jefe Cardiología
JAIME GOICH M.D	SUBDIRECTOR MEDICO INT
CARMEN LUZ NARANJO	ENFERMERA COORDINADORA
Jorge Zavala Gallegos	Enfermero Jefe SOME Inst. de Neurocirugía
SOLEDAD ESTELLE	ENFERMERA COORDINADORA INST. DE NEUROCIRUGÍA
RUBEN ARIAS	ENFERMERO COORDINADOR INST. NAC. GERIATRÍA
JUAN PEREZ	SUBDIRECTOR MEDICO INC
Patricio Herrera	Médico, Servicio Geriatría ING
DOUGLAS EDEMA MD	Trinity Health
ROBERT BEYER	THI

REUNION DE TRABAJO
CONVENIO U.S.T.D.A - T.H.I.

TEMA: Visita Unidades Hospital El Salvador

FECHA: 25/4/2005 9:30 - 13:00

NOMBRE	CARGO	TELEFONO
Arnoldo Uribe	Recursos Físicos	
Robert Larkin	THI	
Pierre Gomion	THI	
Cristian Zañartu	HDS	
Roxana Sepúlveda	HDS	
Pablo Pérez	HDS.	
Enrique Saint Pierre	CHSI	

REUNION DE TRABAJO
CONVENIO U.S.T.D.A - T.H.I.

TEMA: METODOLOGÍA PARA DEFINIR ASPECTOS DE DISEÑO HOSPITALARIO

FECHA: 25 - ABRIL - 2005

NOMBRE	CARGO	TELEFONO
PEDRO MARTÍNEZ	ARQUITECTO	757-6191 09-2481936
ANA MARIA Volosky	Jefe Recursos Fisicos	7576188
DON VELSEY	TRINITY HEALTH ARCHITECT	1-202-335-3784
INES RIVEROS	INTERPRETE	2313367.
HERNAN UGARTE	~~ARQUITECTO~~	7576187
ERICH BIRCHMEIER	ARQUITECTO.	

REUNION DE TRABAJO
CONVENIO U.S.T.D.A - T.H.I.

TEMA: FICHA CLÍNICA ELECTRÓNICA

FECHA: 25 Abril 12:00 hrs

NOMBRE	CARGO	TELEFONO
Patricio Pooryte[illegible]	Subdirector Médico INCA	2003204
Luis Osorio	Jefe Proyecto TI CHSI	7576008
JAIME GOICH	SDM - INT.	3403402.
María Loreto O'Ryan	INT 6751095-K.	2273298.
Enrique Saint Pierre	CHSI	
Juan Pablo Sepúlveda	CHSI	
Manuel Sepúlveda	Lab. Central HdS	3404508
Lautaro Badilla	Jefe Neuro RX-INC	09-8221918
M. Elena Sepúlveda	Farmacia	3404614
Evelyn Villalón	J. Gestión Clínica	3404291
Karin Goecke	Depto Planif y Desarrollo	7876055.

REUNION DE TRABAJO
CONVENIO U.S.T.D.A - T.H.I.

TEMA: FICHA CLÍNICA ELECTRONICA

FECHA: 25 Abril 12:00 hrs

NOMBRE	CARGO	TELEFONO
John Vida A.	Ing. de Proyectos	2583321.-
Dr Sergio Santos Nash	JEFE CAE Inst Nac Geriatria	santosgeriatra@yahoo.es 4218090
Verónica Medina	Proyecto CS-I	7576282.
Joyce Durham	T. I.	
DOUGLAS EDEMA, MD	T.H.I.	
ROBERT BEYER	THI	
Ignacio Astorga	CHSI	
MARIO DONOSO SCROPPO	BANCO DE SANGRE	092368284
Sergio Galaz	oftalmología	09-9916779 sgalaz@gmail.c
Santiago Venegas	CH SI	
Irina Pino	CH S-1	

REUNION DE TRABAJO
CONVENIO U.S.T.D.A - T.H.I.

TEMA: Modelo de Gestión Enfermería

FECHA: 25 Abril, 15:00 hrs

NOMBRE	CARGO	TELEFONO
Evelyn Villalon	J. Gestion Clinica	3404291
Patricia Perales	Enfermera Coordinadora (S) HDS	3404328
Miguel Guajardo	Enfermero Coordinador HdS	34004340
Ruth Hormazabal	Enfermera Coordinadora HdS	3404345
CARMEN LUZ NARANJO	Enferm. Coordin.	3403485
Luis Osorio	ING. TI. CHS-i	7576008
Frank Smith	Trinity	
ROBERT LARKIN	TRINITY	
DOUGLAS EDEMA, MD	T.H.I.	

REUNION DE TRABAJO
CONVENIO U.S.T.D.A - T.H.I.

TEMA: Modelo de Gestión Enfermería

FECHA: 25 Abril; 15:00 hrs

NOMBRE	CARGO	TELEFONO
Joyce Durham	T. I.	
DOUGLAS EDEMA, MD	T. I.	
Veronica Medina	Proyecto C. S-T	7576282
Patricia Peñalo	Hosp del Salvador	3404328
Miguel Guajardo	Hosp. del Salvador	3404340
Ruth Hormazábal	Enfermera Hosp del Salvador	3404345
CARMEN LUZ NARANJO	COORDINADORA INT	3403485
RUBEN ARIAS	COORDINADOR ING	4218090 ANEXO 41
SOLEDAD FUELLE A.	COORDINADORA INCA	2003278
Sonia Zavala G	EU Jefe SOME	2003214

REUNION DE TRABAJO
CONVENIO U.S.T.D.A - T.H.I.
JORNADA TARDE

TEMA: PMA - PARTIDO GENERAL / RECOMENDACIONES PARA ELABORAR BASES DE LICITACIÓN
FECHA: 25- ABRIL - 2005

NOMBRE	CARGO	TELEFONO
PEDRO MARTÍNEZ C.	ARQUITECTO	757 6191 757 6187
ERICH BIRCHMEIER S.	ARQ.	"
HERNAN UGARTE E.	ARQUITECTO	"
Luz RIVEROS	INTERPRETE	231 3367
DON VELSEY	ARCHITECT	
Ana Maria Volosky	Jefe RPFF SSMO	7576188

REUNION DE TRABAJO
CONVENIO U.S.T.D.A - T.H.I.

TEMA: Administración de Residuos

FECHA: 25 Abril - 15:00

NOMBRE	CARGO	TELEFONO
ARNOLDO URIBE	ING. PROYECTO CHS-I	7576219
CRISTIAN ZAÑARTU MATURANA	TECNICO AMBIENTAL	3404316.
Roxana Sepulveda A.	Ing. Qco Experto Prev. Riesgo SSMO	7576010
John Díaz A.	ING. Proyectos - M.O.P	2583921.-
Pierre Gagnon		

REUNION DE TRABAJO
CONVENIO U.S.T.D.A - T.H.I.

TEMA: Equipamiento CHS-1

FECHA: 26 Abril, 9:30 hrs

NOMBRE	CARGO	TELEFONO
John Díaz A.	Ing. Proyectos - MOP-CGC	2583921
Juan Pablo Sepúlveda.		
Enrique Saint Pierre		
Mirna Piñero H		
Luis Osorio		

REUNION DE TRABAJO
CONVENIO U.S.T.D.A - T.H.I.

TEMA: Equipamiento CHS-1

FECHA: 26 Abril 9:30 hrs.

NOMBRE	CARGO	TELEFONO
Veronica Medina	P. C.S-I	7576282
ARNOLDO URIBE	P CHS-I.	7576219
Roxana Sepúlveda H	Experto Prev. Riesgo Ing. Qco	7576010.
Ignacio Astorga	CHS-1	
Frank Smith	Trinity International	
Pierre Gonyon	Trinity Int.	
ROBERT LARKIN	TRINITY INTL.	

REUNION DE TRABAJO
CONVENIO U.S.T.D.A - T.H.I.

TEMA: Estaciones Enfermería - Nº Camas por habitación Localización del Proyecto, Análisis de Alternativas

FECHA: 26 - ABRIL - 2005

NOMBRE	CARGO	TELEFONO
PEDRO MARTÍNEZ C.	ARQUITECTO	7576191
HERNAN UGARTE E	ARQUITECTO.	"
DON VELSEY	ARCHITECT	1-202 338 3784
Ana Maria Volosky	ARQUITECTO	7576188
Sally Segal	Arquitecto	2200513
ERICH BIRCHMEIER S.	ARQUITECTO	7576191
Joyce Durham	TI	
Pierre Gougon	TI	

REUNION DE TRABAJO
CONVENIO U.S.T.D.A - T.H.I.

TEMA: Modelo de Rehabilitación del CHS-1

FECHA: 26 Abril 15:00 hrs

NOMBRE	CARGO	TELEFONO
[illegible] López	Kinesiólogo	2003249
E. Herring	SDM.	
M. [illegible] H	Kinesiólogo H del S.	3404232
Guido Espinoza	Servicios Rehabilita c. Médicos	3404806
Elisa. Gutiérrez	Rehabilit. A. Mayor	7576039
Andrea Giscard	Subdirección Estudio INT	3403471
Dr. Alvarez	Serv. Neurología	

REUNION DE TRABAJO
CONVENIO U.S.T.D.A - T.H.I.

TEMA: Modelo de Rehabilitación del CHS I

FECHA: 26 Abril, 15:00hrs

NOMBRE	CARGO	TELEFONO
Lorena Cerda A	Jefa Servicio de Rehabilitación ING	4218090 anexo 30
Luis Osorio	Jefe Proy. TI CHSI	7576008

REUNION DE TRABAJO
CONVENIO U.S.T.D.A - T.H.I.

TEMA: Modelo Ambulatorio - Hosp de Día

FECHA: 27 de Abril, 9:30

NOMBRE	CARGO	TELEFONO
Emilio Roessler	Jefe Medicina H del Salvador	3404521
Evelyn Villalon	U. Gestion Clínica	3404291
Lucia Toro S.	P. Especialidad S Med.	3404 234 · 491.
Juan Lombardi	Cirugía	3404 226
Felipe Urcelay	Neurocirujó	2360941
Fernando Gonzalez F	Nefrología Diálisis	3404367
Enrique Saint Pierre	CHS-I	
Juan Pablo Sepúlveda	CHS -I	
DAISY DONOSO	Jefe Servicio MF y Rehabilitación	3404 256 3404 506.

REUNION DE TRABAJO
CONVENIO U.S.T.D.A - T.H.I.

TEMA: Modelo Ambulatorio - Hosp de Día

FECHA: 27 Abril, 9:30

NOMBRE	CARGO	TELEFONO
[illegible]	[illegible]	3404405
[illegible] E. Orellana F	Enf Coordinadora Oncología [illegible]	2049980 3404404
CARMEN LUZNDRANO	COORDINADORA ENFERMERA INSTITUTO NACIONAL DEL TORAX	3403485
JEANNIE HENRICKSON	ENF. SUPERVISORA CONS. EXTERNO	3403407 3403590 3403424.
E MERINO	SDM H. SALVADOR	
Lorena Cerda	Jefe Servicio de Rehabilitación ING	4218080 anexo 30
[illegible] Zavala	EU Jefe SOME INCA	7003214

REUNION DE TRABAJO
CONVENIO U.S.T.D.A - T.H.I.

TEMA: Taller Gestión del Cambio

FECHA: 27 Abril 15:00 hrs

NOMBRE	CARGO	TELEFONO
Santiago Venegas D.	Sec. Ejecutivo Proyecto CHS-1	7576220
Ricardo [illegible]	Director INT.	3403402
Hector Olguin	subdirector medico SSMO	
Jaime Arriagada C	SDA. SSMO	7576006
CARLA MENENDEZ A	JEFE U. LOGISTICA E INFORMATICA	3403506.
Silvana Echeverria C.	SDA INT	3403502
Andrea Giscard.	Subdirección Estudios INT	3403471.
Carlos Altamirano C	H. Salvador.	3404220.
Mirna Pino	CHS-1	
Juan Pablo Sepúlveda	CHS-1	
Enrique Saint Pierre	CHS-1	

REUNION DE TRABAJO
CONVENIO U.S.T.D.A - T.H.I.

TEMA: Taller Gestión del Cambio

FECHA: 27 Abril 15:00

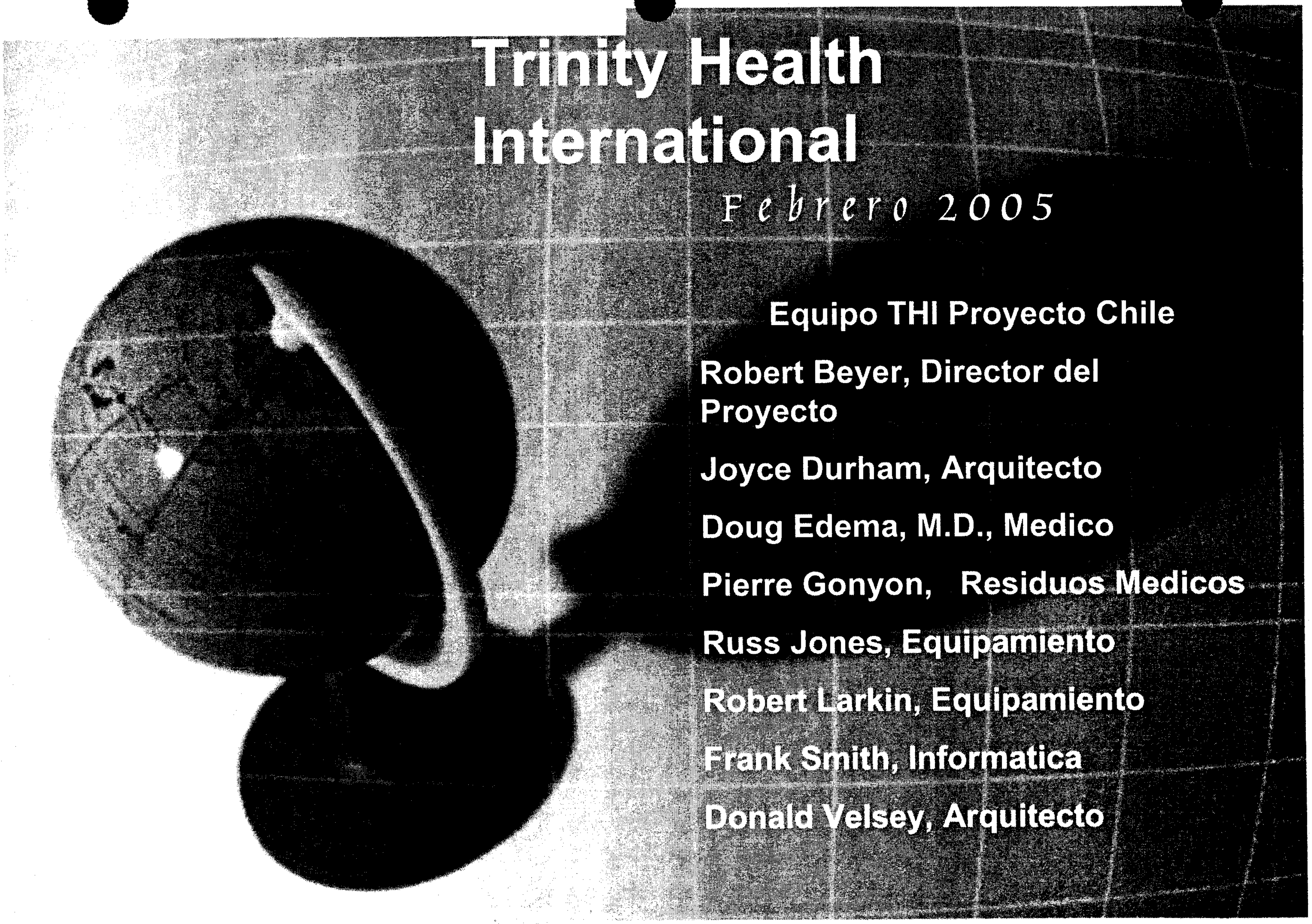
NOMBRE	CARGO	TELEFONO
E Hering	SDM Hal S	3404513
Verónica Ibacache	SDA - HdelS.	3404222
Juana Silva	Directa JMG	2362573
Ruben Arias	EU. JEFE ING.	4218090/41.
Ivan Gallo	SDA ING	4218090
Patricio Malinarich	SDA. Neurocirugía	2003206
Luis Osorio	Ti CHSI	756008
Andrea [illegible]	Directora Ssrlo	7576004
Ignacio Astorga	CHSI	

REUNION DE TRABAJO
CONVENIO U.S.T.D.A - T.H.I.

TEMA: Modelo de Negocios CHS-I

FECHA: 28 Abril

NOMBRE	CARGO	TELEFONO
Santiago Venegas D.	CHS-I	7576220
Verónica Medina	CHS-I	7576282
IGNACIO GYSLING	CGC	2583948
John Diaz A.	CGC	2583921
Robert LARKIN	THI	-
ARNOLDO URIBE	CHS-I	7576219
Enrique Saint-Pierre	CHS-I	
Mauricio de la Barra	IKONS	2066760



Trinity Health International
Febrero 2005
Equipo THI Proyecto Chile
Robert Beyer, Director del Proyecto
Joyce Durham, Arquitecto
Doug Edema, M.D., Medico
Pierre Gonyon, Residuos Medicos
Russ Jones, Equipamiento
Robert Larkin, Equipamiento
Frank Smith, Informatica
Donald Velsey, Arquitecto

Quien Somos

Who we are

- **Un subsidiario sin fines de lucro de Trinity Health**

  A non-profit subsidiary of Trinity Health

- **En existencia desde 1981**

  In existence since 1981

- **Una organizacion que provee servicios de gerencia, consultoria, asistencia tecnica y entrenamiento a organizaciones privadas y ministerios de salud alrededor del mundo**

  An organization that provides health care management, consulting, technical assistance and training services to private organizations and ministries of health around the world.

Nuestra Experiencia

Our Experience

- **Mas de 180 contratos en 41 paises desde 1981.**

  More than 180 contracts in 41 countries since 1981.

- **Mas de 900 asignaciones dentro de los 180 contratos.**

  More than 900 assignments within the 180 contracts.

- **Mas de 340 participantes de Trinity Health y organizaciones asociadas.**

  More than 340 project participants from Trinity Health and associated organizations

Nuestra Metodologia

Our Methodology

Creemos que toda asistencia y producto laboral debe ser diseñado especialmente para coincidir con las necesidades especificas del ambiente, la cultura y la organizacion con quien estamos trabajando.

We believe that all assistance and work product must be custom designed to fit the specific needs of the environment, culture and organization we are working with.

Nuestra Metodologia

Our Methodology

- Utilizamos los recursos de Trinity Health y organizaciones asociadas para la implementacion de nuestros proyectos
  - Recursos Humanos
  - Recursos Materiales
  - Establecimientos

We utilize the resources of Trinity Health and associated organizations for the implementation of our projects

- *Human Resources*
- *Material Resources*
- *Facilities*

Quien es Trinity Health

Who is Trinity Health

- Una de las organizaciones de salud sin fines de lucro mas grandes de los EEUU

One of the largest non profit health systems in the United States

- Mas de 48,000 empleados y 10,000 medicos asociados

More than 48,000 employees and 10,000 associated physicians

- Es dueño de, y maneja, las siguientes organizaciones: mas de 40 hospitales, mas de 30 hogares para ancianos, una empresa de informatica, una empresa de arquitectura, una empresa de seguro de salud, una empresa internacional de asistencia tecnica y gerencia

Owns and manages the following organizations: more than 40 hospitals, more than ... aging ... stems organization, an architectural ... international technical assistance and

Quien es Trinity Health

Who is Trinity Health

- **Una Organizacion Catolica guiada por una mision y valores organizacionales**

A catholic organization guided by a mission and organizational values

- **Recipiente del National Quality Health Care Award para 2004 otorgado por el Comite Nacional para Calidad en Servicios de Salud.**

Recipient of the National Quality Health Care Award for 2004 given by [illegible]nal Comm[illegible]alth Care

Quien es Trinity Health

Who is Trinity Health

- **Mision: Servimos juntos en Trinity Health, en el espiritu del Evangelio para sanar cuerpo, mente y espiritu, para mejorar la salud de nuestras comunidades, y cuidar los recursos que nos han encomendado**

  Mission: We serve together in Trinity Health, in the spirit of the Gospel to heal body, mind and spirit, to improve the health of our communities and to steward the resources entrusted to us.

- **Valores Organizacionales: Respeto, Justicia Social, Compasion, Atencion a los pobres y minusvalidos, Excelencia**

  Organizational Values: Respect, Social Justice, Compassion, Care of the poor and underserved and Excellence

Ejemplos de Experiencia THI

Examples of THI Experience

- **Ejemplos de paises donde hemos trabajado:**

  Arabia Saudita, Argentina, Australia, Brazil, Inglaterra, Guyana, Mexico, Tanzania, Malasia, Irlanda, Fiji, Islas Marsiales, Zimbabwe, Croatia, Rusia

Examples of countries where we have worked: Saudi Arabia, Argentina, Australia, Brazil, England, Guyana, Mexico, Tanzania, Malaysia, Ireland, Fiji, Marshall Islands, Zimbabwe, Croatia, Russia

Ejemplos de Experiencia THI

Examples of THI Experience

- Ejemplos de Proyectos:

  Gerencia hospitalaria, desarrollo de servicios de salud mental, entrenamiento de personal biomedico, fortalecimiento institucional, entrenamiento de gerentes hospitalarios, servicios de asesoria a ministerios de salud

Examples of Projects:

Hospital management, development of mental health services, training of biomedical engineers, institutional strengthening, training of hospital managers, advisory services to ministries of health.

Conclusion

Les agradecemos por la oportunidad de ser parte de este proyecto tan importante.

We thank you for the opportunity to be part of this important project.